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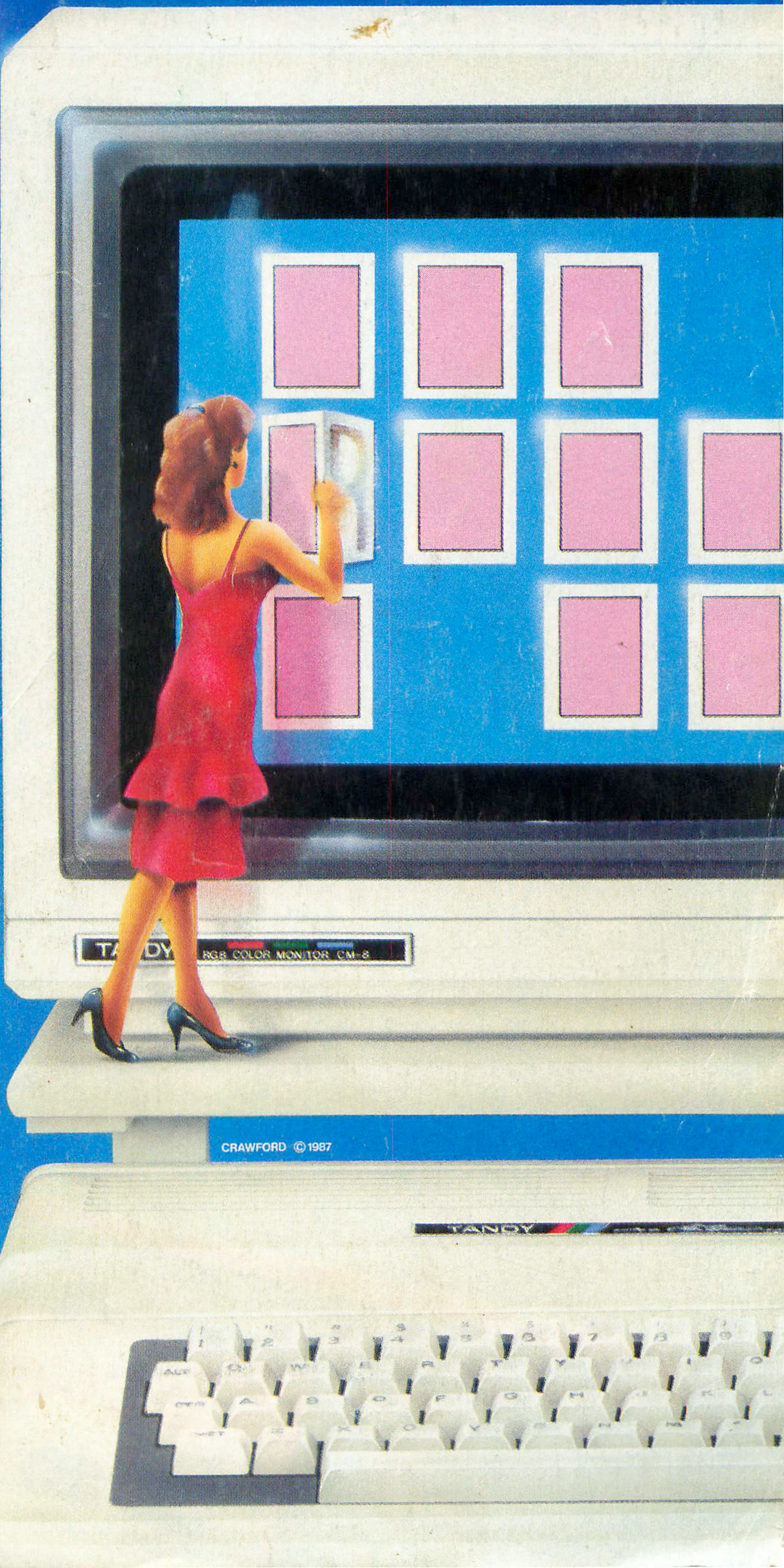
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Classtime

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Tony on memory
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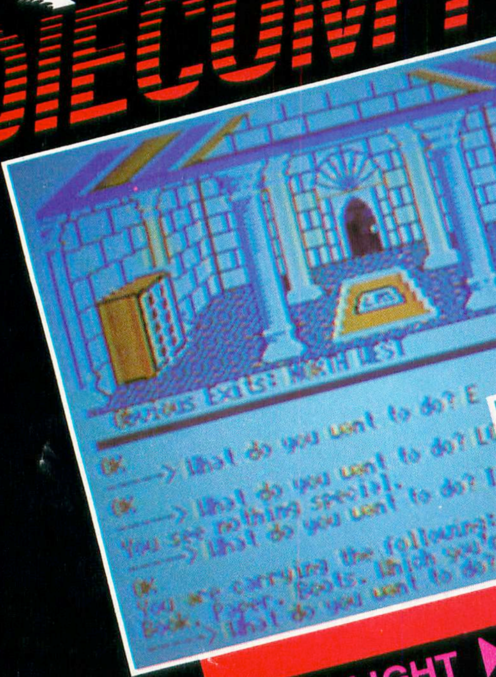

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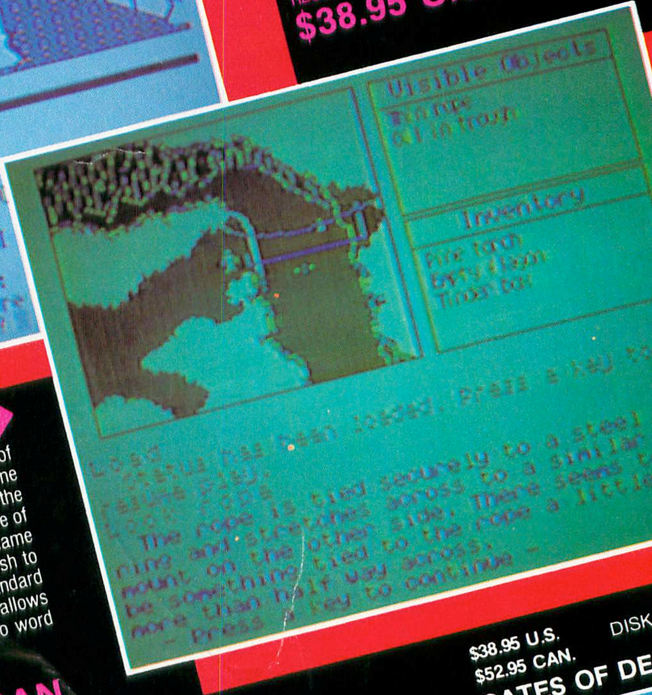

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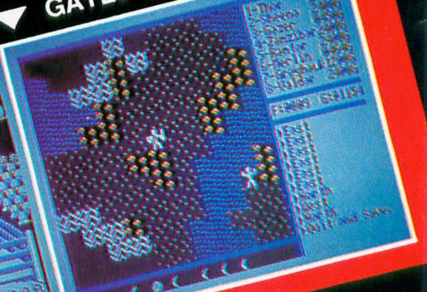

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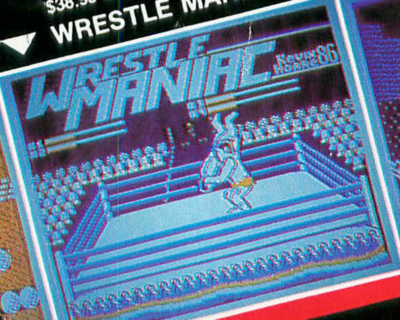

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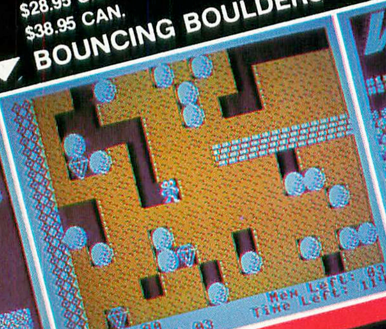

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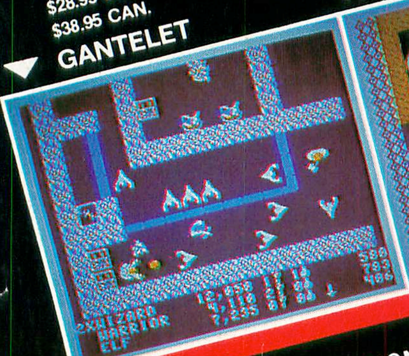

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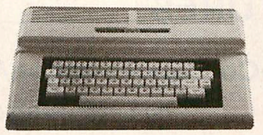
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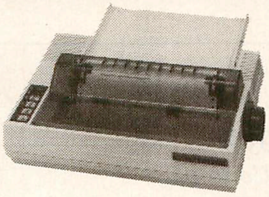
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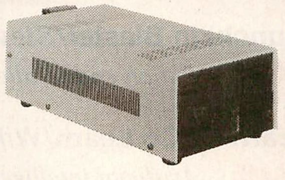
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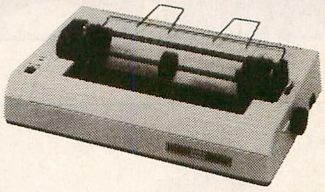
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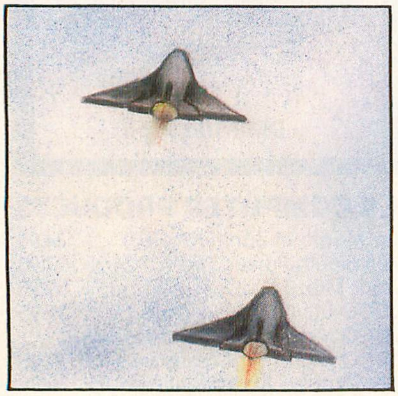

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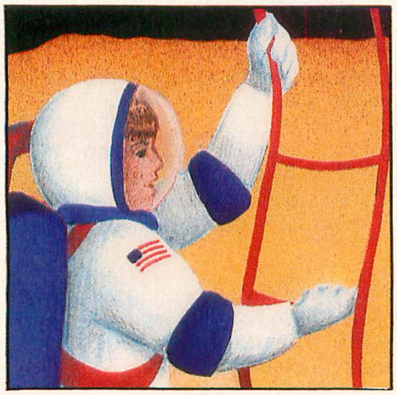

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NEXT MONTH: The long, hot summer is nearly at an end, and CoCo kids of all ages are getting geared up to go back to school. Students will be looking for subjects that challenge their skills and imagination; parents and teachers will be looking for ways to make learning exciting and meaningful. And just in time, our September Education issue will deliver a full line-up of programs to illuminate, edify and amuse!

Look for an assortment of imaginative educational features, including Hi-Res ABCs, math and reading comprehension programs, along with the regular — and *always* educational — product reviews, tutorials and columns.

Exploring the world of the Color Computer is an ongoing education for one and all, and THE RAINBOW will put you and your CoCo at the head of the class!

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LETTERS TO THE RAINBOW

SysOp Stands up for a Clean Board

Editor:

I applaud your "Print#-2" column in the April 1987 issue. The column discussed copyright laws and the clubs, BBS and pen pal listings provided by THE RAINBOW. I am a SysOp of Lansing's CoCo BBS. Ever since I began operating Benchboard BBS in 1984, I've had to deal with ridicule from a few users for attempting to run a "clean" board. I've also had to deal with the mentalities expressed by both SysOps mentioned in your column; the "I didn't know" type and the "I know it's OK because I got them from another BBS" type.

I appreciate the support of the Greater Lansing Color Computer User's Group (CCUG) and articles such as yours. Please continue to remind those who "don't know," while maintaining THE RAINBOW's clubs, BBS and pen pal listings. These listings provide contact for the many computerists who *do* respect copyright laws.

John Evans
Lansing, MI

Bit-Banger Rebuttal

Editor:

In the "CoCo Consultations" column of the March 1987 issue, Page 151, a reader used the expression "bit-banger" in a request for information. This expression has been used in a derogatory sense for some time by columnists in THE RAINBOW as though the serial port of the CoCo is in some way inferior. As your readers seem to be starting to use the expression, it is probably time to set the record straight.

The RS-232 specification defines an industry standard for serial data communications that is a bit-by-bit transmission and reception standard. It does not matter whether one uses a PIA or a UART to produce those bits to provide the serial bit stream. The UART produces other signals as well that a modem's hardware and software may expect; however, if the modem and its software are designed carefully, it will still operate with a simple bit stream satisfactorily. What does matter a lot is the design of the terminal software at each end of the communications loop and the care used in writing and tuning the time delay loops.

Super Color Terminal, by Dan Nelson (Softlaw, VIP), is an example of quality software that works reliably through the CoCo serial port, in duplex, at baud rates up to 4,800.

My two "old gray" CoCos run in a master-coprocessor mode, communicating at 8,000 baud, through their serial ports. Additionally, the transmit and receive routines in my *Kamelion* [See March 1987, Page 141] software for the CoCo/SC68008 combination operate reliably through the serial port, at 4,800 baud, duplex, with a Tektronics 4105 color terminal.

So, you see, if unreliability is encountered when using a well-designed modem, it is the software, not the CoCo's PIA-driven serial port that is not reliable above 300 baud.

D.J. Leffler
Cocoa Beach, FL

Computer Contributions

Editor:

I represent a non-profit, charitable organization that uses microcomputer equipment in virtually every aspect of its affairs. We would be grateful if your readers would consider contributing additional equipment. Donations of this sort can have substantial tax benefits. If you are in a position to contribute or would like more information, please write or call (collect, if you like) (617) 495-9020.

Dr. Robert Epstein
Executive Director
Cambridge Center for Behavioral Studies
11 Waterhouse St.
Cambridge, MA 02138

Discovering CoCo Software

Editor:

Why don't Radio Shack stores sell THE RAINBOW? I think the thing that hurts the CoCo most is that many new CoCo owners think the only programs available for the Color Computer are the ROM packs and disk software from Radio Shack. They fail to see the super programs from Diecom Products, Colorware and many other great software dealers. I'm not trying to put down Radio Shack (they did make this awesome computer), I just wish people would quit saying "Yeah, I got a Trash-80 Computer, but their games are sorry."

Francisco Rios
Houston, TX

BACK TALK

Editor:

I must disagree with Dale Puckett's implied position that `Login` for OS-9 Level II is superfluous. Admittedly, most users do not require multiuser capabilities, and the multitasking capabilities are astounding. However, there are a few of us who use the CoCo in a multiuser mode and require the capabilities `Login` provides.

We use a CoCo 2 with hard drive and two DT-100 terminals as a point-of-sale system in our store. The system operates under OS-9 Level I and is written in BASIC09. (Performance rivals and often exceeds similar systems provided by the three-letter and other large companies.)

We are completing the conversions necessary to run the system on the CoCo 3 under Level II. One major stumbling block has been the lack of restrictions to accessing certain files. Everyone is super-user. Also, should two salespersons write sales tickets simultaneously, the printer will print both sales tickets simultaneously, alternating lines. To prevent this, we had to rewrite the printer device descriptor making it non-shareable which, in turn, required that some of the associated software be rewritten. A `Login` capability, normally part of OS-9, would have alleviated these problems.

Edward Gresick
Middletown, DE

HINTS & TIPS

Editor:

I just received my May RAINBOW and, as always, read it from cover to cover right away. In it, two people ask about printer codes for underlining using *VIP Writer* and the Smith-Corona printer. Since I use both in my home business, I thought I would help if I can.

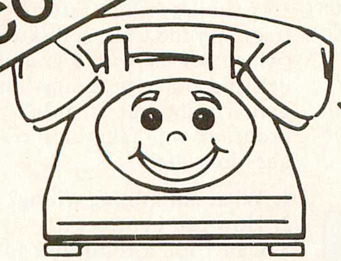
Smith-Corona L-1000 Printer Codes

Code 3 turns on underline — all words:
`3=27;69`
Code 1 turns on underline — one word:
`1=27;90`
Code 4 turns off both underlinings:
`4=27;82`

Since I use two printers (the other is an Epson LX-80), I have a list of codes for each and load each one before doing any writing. This also helps remind me which printer to turn on and which to turn off. You must use the "no print" comment (CLEAR-SHIFT+) in front of anything you do not want printed.

Roxann Brown
Franklinville, NY

RUNS ON COCO 3



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The Button 'll Fool Ya

Editor:

The CoCo 3 with an analog RGB monitor gives no indication when it is turned on. Its power button, when turned on, extends farther out than the power button on a CoCo 1 does when it is turned off. I recommend that the computer plug be disconnected when inserting or extracting the disk controller. Had I taken these precautions, I would not have blown my controller within 15 minutes after having received it.

The chip most likely to be damaged in CoCo disk controllers is the 7416. There are two of them in the Disto controller. The WD1773-PH can also be destroyed, but less often. Since the cost of a 7416 chip is currently about $2.40 from most electronics parts distributors, it is a reasonably good gamble to try replacing this chip before sending the entire controller to be repaired for a charge of about $30.

James Harris
Troy, MI

COCO 3

Editor:

There are those who are worried about RAINBOW covering mostly CoCo 3 in the future, but I am sure what you give the most attention to will be governed by what you receive from your readers. We bought a CoCo 3 as soon as it was available and are enjoying it more with each new program from your magazine. I do hope your guide to OS-9 Level II will be helpful, as I couldn't get anywhere on my own.

Tom David
Ganges, British Columbia

Keyboard Substitution

Editor:

When I read your September '86 preview of the CoCo 3 home computer, dreams of complex new word processing and/or database management, combined with fully integrated graphics applications (running concurrently under OS-9 Level II) floated in my mind. Alas, Radio Shack kept the old repulsive Model I and Apple II+ compatible, non-Selectric keyboard.

It's incredible that they didn't implement the excellent layout of the now-obsolete IBM PCjr (the replacement one, not the original Chiclet-type). It includes all the necessary keys (and more), in a small, portable, detachable, cordless, Selectric-type unit.

Now, I wonder, is there any way to interface a PCjr (or Compatible) keyboard to the CoCo 3 and thus solve Tandy's mistake? Then it would be simple to write a device-driver under OS-9 to gain access to it. I know many people who would sell their PCjr keyboards. Surely this could make the CoCo 3 Number One in the home computer arena. Long live CoCo!

Carlos A. Osuna Roffe
Monterrey, N.L.

REQUEST HOTLINE

Editor:

I am looking for all the CoCo users in the (509) area code of Washington State. Please call 547-4293, or write.

Troy Sanders
209 S. 26th
Pasco, WA 99301

Program Wish List

Editor:

I am looking for a program to use with my 64K ECB CoCo 2, C-Itoh Prowriter 8510 printer, and twin Digital drives. I am a sales manager with 470 part-time and full-time real estate agents and have to keep a running roster of them that can be updated periodically. I am currently using a program called *Label III* by Owl's Nest Software, but it has limitations that make it difficult to operate. The program I need must do the following:

1. Store names, addresses (street, city, and ZIP codes with a provision for an extra line) and phone numbers.
2. Sort quickly through the files (auto-loading files as it sorts). Search by last name (by ZIP and first name would be nice, too).
3. Print files on fan-fold paper "3 wide" and be able to stop at end of page and start at the top of the next page.
4. Print files on adhesive mailing labels.
5. Store large amounts of files (400 to 600). It is OK to refer back and forth to the disk automatically.

I would prefer for the program to be written in machine language, but BASIC is OK if it will do the above functions.

Donald Skaff
Toledo, OH

BBS Quest

Editor:

I was reading the section called "Bulletin Board Systems" in your May issue. I have been wanting to set up a bulletin board for a long time and have called all over the area looking for one, but haven't been able to find one. I see that there are a lot of them listed here in your magazine. Could someone tell me where I can purchase a BBS program?

Jeff Sweet
R.D. #1 Box 480
Gloversville, NY 12078

Check out our four-part series on the CoBBS bulletin board system in the November '85 through February '86 issues.

VIP Frustrations

Editor:

I am the happy owner of a new CoCo 3. It's been a long time coming and I sure like it. However, I have the entire *VIP* series and none of it works on my new CoCo. I have been hoping for months that a patch would be published in THE RAINBOW. I've read that a patch is on Delphi, but I can't get there because I have *VIP Terminal.* Can anyone out there help me?

Also, can anyone tell me how many CoCo 3s have been sold so far? Now that our favorite computer has the memory that the big guys do, will we get programs like *Lotus*, *dBASE*, *Pfs*, etc.?

Robert W. Jobin
5430 Quail Run West
Theodore, AL 36582

Seeking an Encore

Editor:

There must be someone out there who can solve my problem. I have a JX-80 Epson printer. I have Bob van der Poel's *Ultra Telepatch* and a CoCo 3. Once, I got the embedded commands to work correctly in the text of a letter to make selected words print in color for emphasis. The next time I tried, I could not get them to work. Would someone please give me the correct procedure?

George Barber
Box 353
Summit City, CA 96089

All Done With Mirrors

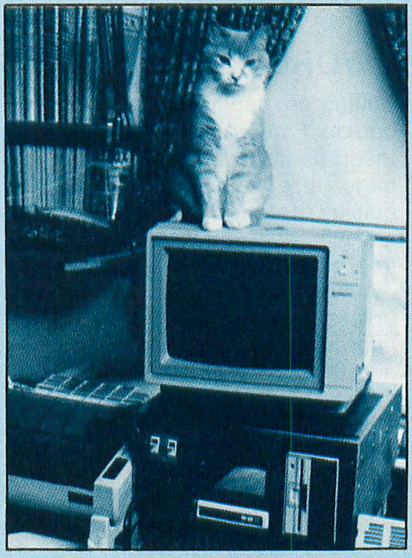
Editor:

I was paging through an electronics magazine and read about someone who was able to interface the Commodore 64 computer to drive digital radio control airplane servos. I was impressed with the article, as it involved a Helium-Neon laser and the ability to store coordinates input from joysticks to later drive the servos in the desired sequence. Mirrors were hooked onto the servos and a rather impressive laser light show followed.

I have heard that my CoCo is the best there is and I certainly believe it can outperform any C-64 on the street. My question is: Can anyone tell me of a source or article in any magazine that will allow me to emulate this device? I am not an engineer and, therefore, must rely upon someone with that special genius to help me out. Thank you for providing a great magazine for the CoCo user and keep up the good work.

Gregory J. Zamites Jr.
602 Alexander St.
St. Marys, GA 31558

Faithful Feline



Editor:

We just thought you might like to see what our CoCo Cat looks like!

Ira and Leo Goldwyn
Great Neck, NY

INFORMATION PLEASE

Editor:

I have a 64K CoCo ROM Color BASIC 1.2, Disk ECB 1.1, a CCR-81 cassette, Modem IB, a Smith-Corona SE-200 with messenger module and a Line Printer VII. I have Version 1.0 of *Elite-home* and would really like to be able to use it as it's advertised in the RAINBOW. However, after loading 92 albums in the records file I got an IE Error. I called Elite Software, was told no one else had reported such a problem, and to return the disks and they would see what they could do.

A few days later, I received new disks in the mail and, after backing up a set to work from, I started using the Checks program. After loading 184 checks, I got an IE Error. I called Elite Software, who called me back a couple of days later and told me I must have removed the disk from the drive without exiting the program properly.

I formatted another disk and started over. I had been at the keyboard continuously the entire time and the disk had definitely *not* been removed from the drive. I again got an IE Error after 184 entries. I called Elite and was told the only possible way the IE Error could occur was if I had pulled the disk out without following the proper exit procedure. I denied pulling out the disk and was told I must have pulled it out without noticing.

I did my print free (0) on both disks, and on the records disk found that Records took 10 granules (which left me with 8 granules free) and the Checks disk took 11 granules (which left me with 0 granules free). I tried deleting other programs on both disks to gain room, but it didn't work. Neither program will take any more entries. My questions are:

1. What am I doing wrong?
2. How can I correct it?
3. Can I use a third disk for specific fields (e.g., checks, records, etc.)? If so, how do I do it?
4. Is there anyone out there who has had and solved similar problems?

Harry K. Buchanan
314 S. Walnut
Maroa, IL 61756

Poke Preservation

Editor:

Being a novice CoCo owner is really a ball. I've had my CoCo 2 for two months. 64K is plenty of memory for me right now, but I've got a couple of questions about some pokes and peeks I have been reading about in the RAINBOW's last two issues.

I have a DMP-130 printer and it will accept up to 2400 baud. The higher speeds that are achieved at this baud rate are great when I have written a program I want to print out, but how do I use this faster rate when using a program pack like *Color Scripsit*?

I realize `POKE 150,18` will do the trick while programming, but what can I do to keep this poke intact after inserting the cartridge? The computer always wants to drop back to its normal rate. Also, when I `PEEK 150`, my CoCo 2 prints `88`, not `87` like you would expect.

Michael R. Wetzstein
1155 O'Quinn Drive
Tifton, GA 31794

The Upgrade Dilemma

Editor:

Is it worth upgrading to a better, eight-bit machine (CoCo 3) when there are 16-bit machines that don't cost much more? When I speak of 16-bit machines, I don't mean a Tandy 1000 or IBM PC. I am convinced an OS-9 Level II CoCo 3 is better than these. I am interested in the new MC68000-based computers, like the Atari ST and Amiga. How important is CPU clock speed? I love my 64K CoCo 2 and would like to love a CoCo 3, but I have reservations.

Mike Linksvayer
305 Cartwright
Springfield, IL 62704

Another CoCo Heard From

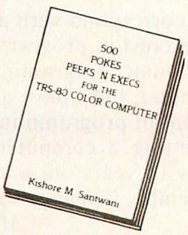
Editor:

Is there anyone out there in CoCo land who can tell me how to get my CoCo 2 to talk without any additional hardware? I have seen many programs advertised that say they have good quality speech, and the speech is made possible through program-

BOOKS & GRAPHICS

500 POKEs, PEEKs, 'N EXECs

FOR THE TRS-80 COCO



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Jim Patterson
7044 Brandywine Drive
Derby, NY 14047

KUDOS

Editor:

I had to send this letter to RAINBOW to let your readers know about the outstanding service I got on a recent order to Micro-World Computer Center.

I ordered a Color Computer 3 by mail — no phone call — and received it in less than a week at quite a savings! MicroWorld rates high in my book.

David Johnstone
Torrington, CT 06790

Speedy Disk Delivery

Editor:

T & D Software should be congratulated on its expedient service and reliability. It is the only company out of several which promptly sent software as part of a "free software" campaign in conjunction with my subscription order to THE RAINBOW. Orders to T & D are filled quickly and often arrive within two weeks. Recently, I experienced trouble with some disks and returned them for replacements. The new disks arrived the same week! It is refreshing to find a business that conducts "good business" — and T & D accomplishes that task.

Lynn Simmons
New Orleans, LA

An Assortment of Support

Editor:

I would like to take this opportunity to thank all the RAINBOW staff for bringing such a fine publication to the CoCo world.

I would also like to pass on special thanks to Greg Miller and Erik Gavriluk for taking the time out of their day to talk to fellow users about seemingly trivial bits of CoCo information. These are two very talented programmers, and I appreciate very much what they are doing for the CoCo world.

More thanks are in order for Computize's service department, which has been very friendly and helpful every time I've called.

Finally, my hat is off to Mr. B.J. Chambless and Computerware for their long-term and continued support of the CoCo. I bought *Magic of Zanth* [See March 1987, Page 140] and *Ramdisk* from them — two great programs for the CoCo 3.

Alan Parker
Grissom AFB, IN

RAINBOWfest Raves

Editor:

We want to express sincere thanks to two organizations:

First, to THE RAINBOW, for sponsoring the Chicago RAINBOWfest. It was amazing to see so many people in one place all dedicated to a computer that so few people seem to know about. (My wife likened it to the Dayton Hamvention, and she was right!) All the vendors and RAINBOW people we met were just great, and we certainly intend to return next year. (And yes, we did pig out on software, not to mention hardware!)

Second, our thanks to the Elliotts at HJL Products. We bought an HJL Numberjack at RAINBOWfest, and had trouble getting it to work. A letter to HJL brought a very prompt, helpful answer, but when that didn't work, a phone call (on their quarter, yet!) got the information we needed. Support like this is hard to find these days, but HJL really came through, and we thank them for it.

David Wendt
Indianapolis, IN

PEN PALS

- I am $10^1/_3$ years old and have a CoCo 2 and some joysticks. Anyone wanting a pen pal, please write to me.

Armando Perea
824 N. Humbolt #4
San Mateo, CA 94401

- I would like to have some pen pals. I am 16 years old and own a 64K CoCo, a printer, a disk drive and a lot of software.

David Jolley
6656 Lake Avenue
Elyria, OH 44035

- I am 15 years old and looking for a pen pal who has a 64K Extended Color BASIC CoCo 2 with cassette player.

Shannon Webb
Rt. 1 Box 29
Watonga, OK 73772

- I am 14 years old and looking for a pen pal. I have a CoCo 2 and enjoy almost everything. I would like to have pen pals from all around the world.

Dena Warren
3428 So. 109 E. Ave.
Tulsa, OK 74146

- I would like to know if there are any CoCo users in the Pennsylvania area who would like to have a pen pal. I have a 128K CoCo 3, CCR-81 cassette recorder and a DMP-105 printer. I am 11 years old and enjoy games.

Pete Malizia
331 Gertrude St.
Latrobe, PA 15650

- I am interested in having pen pals from the United States and around the world. I am 15 years old, have a CoCo 2, and a CoCo 3 with two disk drives, along with a DMP-105 and CGP-220 printer. I will try to answer all responses.

Ed Emelett
108 Hanlin Drive
Nanticoke, PA 18634

- I'm looking for pen pals once again. I have a DCM-3 modem, a DMP-105 and 130 printer, a disk drive, 64K CoCo, a CCR-82 tape and a Radio Shack monitor. I would like pen pals from everywhere and I will answer all replies.

Chris Curtis
Route 1 Box 186
Walling, TN 38587

- I am a 23-year-old fiction writer seeking pen pals from anywhere with any type of system. I have a CoCo 2 with cassette only, but have access to an IBM PC (GW-BASIC, MS-DOS), and am especially interested in a PASCAL tutor.

Ron Corder
3030 Elmside Drive #23
Houston, TX 77042

- I own a CoCo 2, disk drive, tape deck and a DMP-100 printer. I have lots of games and programs, and have solutions to Adventures like *Dallas Quest*, *Trekboer*, *To Preserve Quandic*, etc. Anyone who wants to write, please do so. I'm into action games like *F-16*, *Wrestle Maniac* and *Shock Trooper*. I just purchased a CoCo 3, also.

Michael Cress
P.O. Box 427
Bridgetown, Nova Scotia
Canada B0S 1C0

- I am 14 years old and looking for pen pals to exchange programs, preferably on disk. I own a CoCo 3, FD-500 disk drive and a CCR-82 tape recorder. I also love solving Adventures and playing CoCo 3 games.

Brendan Wood
360 Victoria #204
Greenfield Park, Quebec
Canada J4V 1M2

- I want to correspond with a pen pal who shares my interest in programming utilities and general BASIC programming. I do not have a computer, but I have quite a considerable amount of programming knowledge. I will be getting a computer in the near future. I am 12 years old and considering learning assembly language soon.

Mathew Dafilis
19 Carolyn Crescent
Bundoora, Victoria
Australia 3083

- I have a 64K CoCo 2 with a cassette system. I'd like to have a pen pal to exhange programs. I have about 200 games.

Ariel Bensimon
9816 Emek Hefer
42220 Natania Israel

- It's a long distance letter from Egypt! I am 25 years old and have a 64K CoCo 2 with a tape system. No one here has a CoCo except me and a couple of my friends. Anyone looking for a pen pal, please write me.

Remon Samy Ebrahem
8 Aziz Fahmy St.
Tanta, Egypt

- I am 26 years old and looking for a pen pal. I have a 512K CoCo 3 and 64K CoCo 2, disk drive, cassette recorder, multipack interface and DMP-200 printer. I have many games and OS-9 Level I and II.

John D. Cleveland
P.O. Box 735
Lunenburg, Nova Scotia
Canada B0J 2C0

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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Some Seventh Year Changes

All's well that ends well.

William Shakespeare wrote it. Wendy Falk said it.

For those of you who read this space last month, I have news to report. Sacy has been found.

Sacy is my eldest daughter's (Soft And CuddlY) teddy bear, who turned up missing when she came home from an around-the-world educational semester aboard ship. Somehow, Wendy's tote bag was lost — and with it her 17 rolls of film, a number of presents and Sacy.

Wendy is 20 and Sacy is 17, so you can imagine how upset she was. After a couple of weeks of hoping he might turn up somehow, Sacy had to be decreed lost. It was depressing. I wrote about it last month. And one of the things I said was that it was a shame Sacy would miss our Sixth Anniversary issue of THE RAINBOW because it would be the first one he had missed.

As it turned out, Sacy was on hand after all. Just a couple of days after we went to press with the July issue and the Saga of Sacy, Wendy got a letter from Delta Air Lines. They had a bag in Atlanta lost and found, they wrote. If she could identify it, they would send it to her.

Wendy didn't fly on Delta, but they apparently ended up with her bag all the same. Her first question when she called Delta was whether Sacy was safe. He was. And it was Sacy's presence that seemed to be adequate to "identify" her lost tote bag.

We're not sure exactly how Sacy ended up in Atlanta or on Delta, but we do know that Sacy arrived on the late flight from Atlanta and Wendy was there to meet him. He's home now, and all the film has been developed and pictures looked at many times already.

Just this evening I came home with the first copy of the Anniversary Issue. Sacy was there to look it over, too. Everyone was glad.

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Thanks, Delta Air Lines. I guess sometimes it helps to wish on a Rainbow.

Year Seven of THE RAINBOW brings some changes.

Jim Reed, who has been managing editor for many years, is moving to a new position as assistant vice president of programs and projects for our parent firm, Falsoft, Inc, and Jutta Kapfhammer — who has been Number Two to Jim for several years — takes over as managing editor.

Expect to see some changes. Jutta comes with a charge to spruce things up a bit, both as far as content is concerned and, with art director Heidi Maxedon, will be looking at new design-type things as well.

Jim will be in charge of a number of special things — some new and some that we hope to expand. He will, of course, as executive editor, continue to work with and advise me directly on this magazine, in addition to our other publications.

There are a number of other changes associated with all of this, of course, but they should not really affect the way you relate to the magazine.

One other change, which may affect a number of you, is in our advertising area. Cindy Shackleford, who has run our West Coast operation for a number of years — first as an employee and then as an independent representative — has decided to seek another opportunity.

> ***"Year Seven of THE RAINBOW brings some changes."***

As a result, we have decided to move all of the advertising territory that Cindy formerly had into our own office here in Prospect. If you are interested in advertising and are in the western part of the United States, you can now get information from Belinda Kirby here. Her number is (502) 228-4497. Those who have worked with Kim Vincent and Jack Garland are unaffected by any of this.

I know you will want to wish Jim, Jutta, Cindy and Belinda well in their new ventures.

By way of "finally," I've been asked to point out two important things here.

The first is that our new OS-9 book, expected to be ready very soon now, is available from us *only* on a pre-order basis. We are not planning to print more copies of the book than for which we have orders on hand when we "go to press." So, if you want one, please order it in advance.

Also, and very important, please fill out (or photocopy and fill out) the Color Computer Hall of Fame ballot on Page 109 of the July issue. And, please, only one ballot per nominator. This is a special program we are planning in conjunction with one of our future RAINBOWfests, and we want everyone to have a chance to make nominations.

— Lonnie Falk

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BUILDING A RAINBOW

Jim Reed jumping off . . .
Jutta Kapfhammer coming on . . .
and Rainbow train keeps rollin' . . .

IN the first installment of my "Building A Rainbow" column, which began in the April 1983 issue, I compared the creation of each month's issue of THE RAINBOW to a train. I also explained that, at a certain point in time, even though my heart remained with "those still on board" as the "Production Express" clattered on down the line toward "Printer's Station," I would have to jump off, roll down the bank and get about the process of forming the next month's "train."

After 55 of these monthly tumbles, this time I'm not forming up another trainload of material as this issue's caboose disappears into the distance. In fact, the September RAINBOW is already chugging along the production line with Jutta Kapfhammer at the controls. She's been appointed the new managing editor of THE RAINBOW.

We were still in that crowded, former-beauty-salon of a RAINBOW office when German-born, but American-raised Jutta (pronounce that "Utah") joined the staff in February of 1983. So, even though she's only 28, Jutta's an "old-timer" by RAINBOW standards. She's been our submissions editor for four years and for the past year has also supervised editorial production for all of our publications. Thus, becoming RAINBOW managing editor, while hard-earned, is but one more feather in her Falsoft cap.

For those who don't know, the managing editor is the one who actually decides what will be in THE RAINBOW, based on broad general guidelines established by editor and publisher Lonnie Falk. Thus, each month, Jutta will make the selection of specific articles to fit the monthly theme as well as "book" a variety of material to ensure a balanced "editorial mix." She will then oversee the entire editorial process, from "putting out fires" to making decisions about style and content, until it's time for her to "jump off the train" and start forming yet another issue. Given the same dedicated support, enthusiastic encouragement and enduring patience that it has been my good fortune to receive from readers and contributors alike, I am sure Jutta will find the challenge a rewarding one, too.

No, no gold watch for me yet. I'm simply going to be exploring and pursuing some new avenues here at Falsoft as assistant vice president for programs and projects. As executive editor, I'll retain a general oversight responsibility for the editorial content of all Falsoft publications and, as groups manager on Delphi, I'll be online almost every evening, as I am now. In fact, many of you will be hearing from me more often than before. So, no goodbyes are in order, but it's impossible to say thank you too often and I want to use this juncture as an opportunity to express my appreciation to all of you, too numerous to mention individually, for helping us "Build a Rainbow" each month over the 4½ years of my tenure as managing editor. I like to think that, together, we met the goal of "something for everyone, and some things for everybody."

Thank you, CoCo Community. I'll miss the rumble, the rhythm and the roar of the monthly train ride, but look for me waving at the crossing whenever the "Rainbow Special" whistle blows. As it was when I first began, "my heart is with those still on board," and I'm proud to be a part of it all.

Finally, the same invitation I extended in that very first "Building A Rainbow": "If you aren't among those who have a year 'round pass to THE RAINBOW's train load of top-flight articles and programs, I hope you'll pull out the subscription card and climb aboard."

Let's keep in touch, keep working together and keep following THE RAINBOW.

— Jim Reed

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CoCo III Software Bonanza	$49.95	$39.95
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*- See July'87 Rainbow pg 69 for product descriptions !!! Also 5% off any product on pg 67 of same issue !!! Offer expires 8/25/87!

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It's here! The CoCoIII BREAKTHROUGH PRODUCT everyone was waiting for! 320x200 graphics, pull down menus, icons the choice of any 16 colors from the CoCo III's 64 color palette plus RGB support! Eleven (11) fonts are included for hundreds of lettering styles and painting is a breeze with 16 colors and 32 editable patterns!!! Color Max III requires a 128K CoCo III and Hi-Res Joystick interface. (Specify printer!) $59.95. Color Max III Pix Converter - contains six (6) converter programs for CoCo Max, Graphicom and 6K binary files $29.95. Hi-Res Joystick interface $14.95.

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It's finally here! An 80 column version of Telewriter-64 for the CoCo III with TELEPATCH features plus much, much more! Use the F1 & F2 keys to access the MAIN MENU or EDITOR & now you can use the CTRL key instead of CLEAR! New FONTS & PRINT SPOOLER too! Req. TW-64 DISK and 128K CoCo III $39.95

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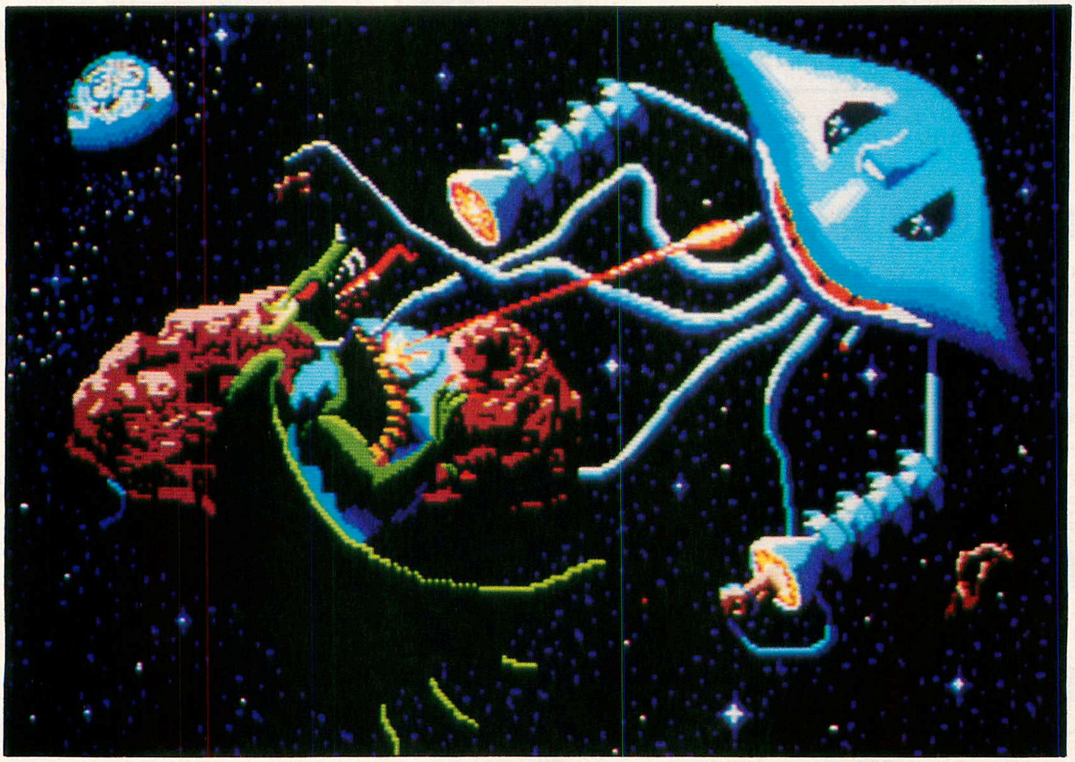
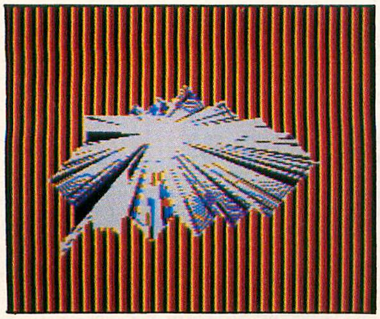
CoCo Gallery



Scavenger **Hal Katschke**

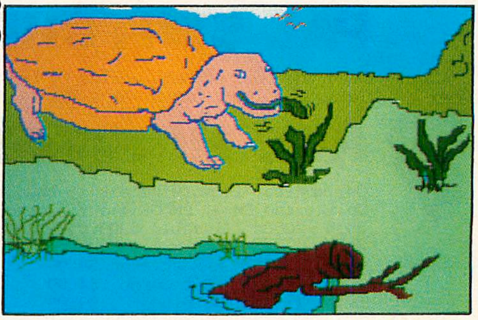
Hal, of Frankfort, Illinois, depicts a scene from the far future when mankind may need to mine the asteroids for fuel. He created this using *Color Max 3*.

Honorable Mention



Paper **Tio Babich**

Tio created this graphic with a program he wrote. *He lives in Miller Place, New York.*

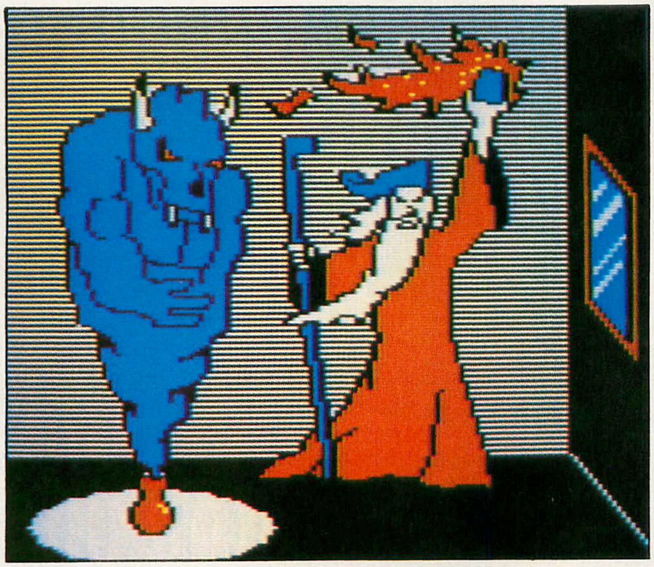


Turtle **D.K. Lee**

This aquatic reptile enjoys a "pondside" lunch on a hot August day. Mr. Lee is the Technical Training Director for a major business equipment manufacturer and created this graphic with *Color Max 3*. He lives in Massapequa, New York.

1st

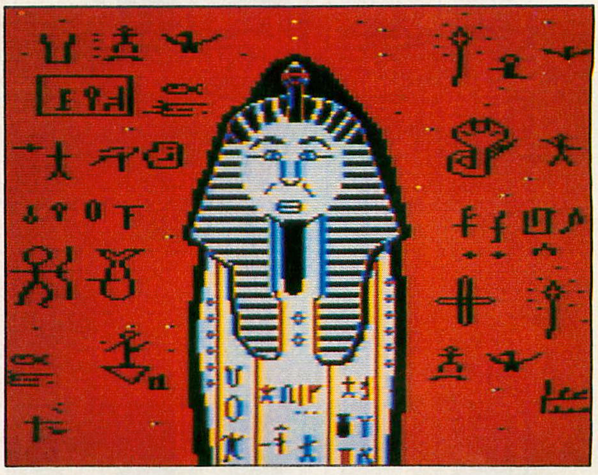
CoCo 1 & 2



The Summoning **Francisco Rios**

This graphic displaying mystic powers was created in BASIC. Francisco lives in Houston, Texas, and is a junior in high school.

2nd



Tut's Tomb **Mark Bollinger**

The mystery of the ancients is revealed in this graphic created with *DeskMate* and BASIC. Mark is a self-taught programmer who lives in Baltimore, Maryland.

SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator

GAME

16K
ECB

CoCo Concentration

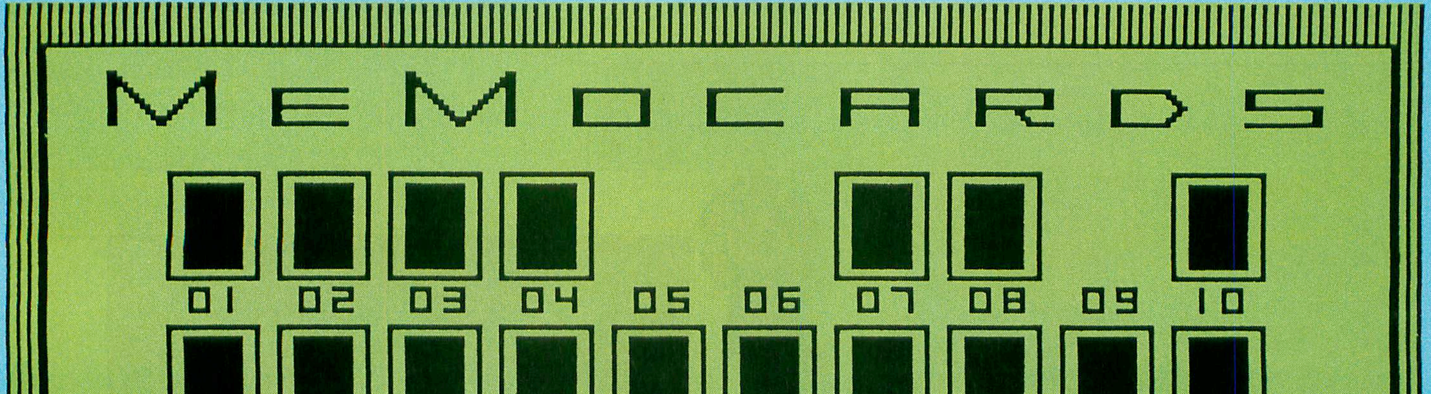
By Allan J. Belanger

Memocards is a game that requires a good memory and strong powers of concentration. It runs on any 16K Color Computer with Extended Color BASIC.

The game has a 40-card grid containing 20 identical pairs that must be matched within a given amount of turns. If

---

Allan Belanger is a computer technician who has experience with eight- and 16-bit microprocessors. His hobbies are designing and building circuits for the TRS-80 systems and writing the software to drive them. He has been involved with electronics for 10 years.


MEMOCARDS
01 02 03 04 05 06 07 08 09 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40
SCORE 34
TURN 46

The Amazing A-BUS

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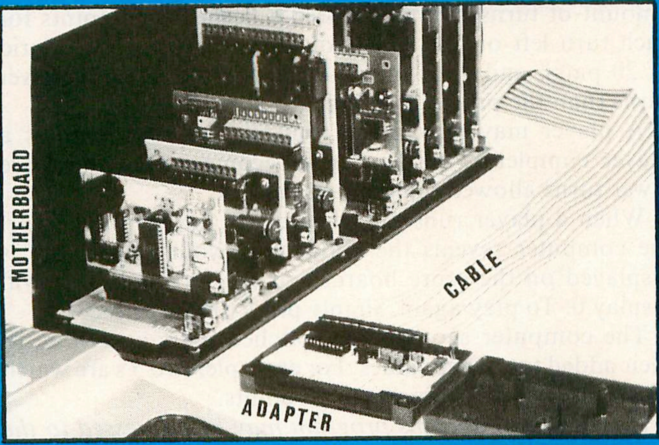

An A-BUS system with two Motherboards
A-BUS adapter in foreground

The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.

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With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card RE-140: $129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm CL-144: $89

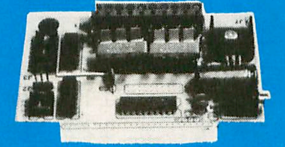
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

Touch Tone® Decoder PH-145: $79

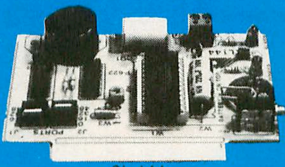
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card PR-152: $15

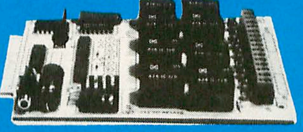
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s



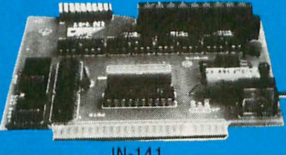
ST-143



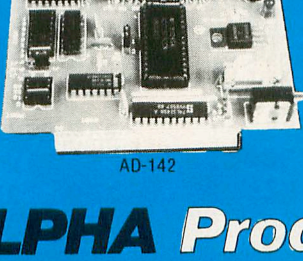
CL-144



RE-140



IN-141



AD-142

Smart Stepper Controller SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option RC-121: $49

To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option PD-123: $89

Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option BB-122: $19

For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).

Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors MO-103: $15 or 4 for $39

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot.	AR-133...$69
Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter).	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable).	AR-132...$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...$39
Color Computers (Tandy). Fits ROM slot, Multipak, or Y-cable.	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.

Special cable for two A-BUS cards: CA-162: $34

A-BUS Motherboard MB-120: $99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT & NY residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%

ALPHA Products
a Sigma Industries Company
242-W West Avenue, Darien, CT 06820

Technical info: **(203) 656-1806**
Orders only Except in CT **800 221-0916**
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All lines open weekdays 9 to 5 Eastern time

you are successful in completing the grid, another grid will be dealt out, and a bonus score will be awarded for the number of turns left upon completion of the grid.

After you load and run the program, the screen shows the main title and the message "Building Graphics" in the center of the screen. After a few seconds, the main playing grid appears showing the 40-card grid, the score set at 0, and the turn indicator set at 60. You are now ready to start playing the game.

Use the digits (0 to 9) on the keyboard to enter the card numbers you want to look at. Two cards must be selected for each turn. The number of the card chosen must be from 01 to 40. For example, if you want to see the two cards numbered 01 and 02, type `01`, and after that card is revealed, type `02` to reveal the second card. A tone sounds for every key pressed. A high-pitched tone indicates that your entry was accepted, and a second key may be pressed. If a low tone sounds after you enter a two-digit number, this indicates that your entry was rejected. You may now enter another two-digit number. Typing any letter resets the keying sequence in case you type a wrong number by mistake.

If the two cards revealed are not a match, the computer lets you examine them for about one second. Your turn indicator will then be decremented by one, and the cards will be turned face down again. At this point, you may make another selection.

When you select two cards that match identically, the computer removes them from the grid, you are scored for the pair, and the turn indicator is decremented by one. At this point, you may make another selection.

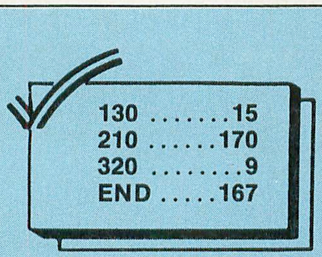
If you complete all 20 pairs of the grid within the allowed amount of turns, you are scored a bonus of 10 points for each turn left on the turn indicator and dealt a new grid of 20 pairs, and your turn indicator is set with five fewer turns than the previous round.

A player may play many rounds. The more rounds a player completes, the harder it becomes, since there are fewer turns allowed to complete the grid.

When a player runs out of turns on the turn indicator, the computer reveals the entire grid, your total score is displayed on the score board, and the turn indicator will display 0. To play again, simply press the space bar.

The computer scores your matched pairs according to their added total face values. For example, two 5's are worth 10 points; two aces are worth 28 points.

(Questions about this program may be addressed to the author at 1857 Durocher St., Varennes, Quebec, Canada J0L 2P0. Please enclose an SASE for a written response.) ☐



130	15
210	170
320	9
END	167

The listing: `MEMOCARD`

```
10 '  MEMOCARDS  VERSION 1.0
20 '  WRITTEN BY ALLAN J. BELANG
ER
30 '  COPYRIGHT (C) 1985
40 '  FOR 16K  EXTENDED COLOR BA
SIC
50 '
60 CLEAR200:CLS:A=8:T1=61:Z=RND(
-TIMER):POKE65495,0:DIMC$(14),S$
(4),I(52),CP(40),B(52),H(2),D(2)
:GOSUB300:PMODE4,1:PCLS1:LINE(7,
7)-(249,184),PRESET,B:POKE178,1:
PAINT(0,0),,2
70 PRINT@71,"MEMOCARDS  VER.1.0"
;:PRINT@199,"building";CHR$(128)
;CHR$(128);"graphics";:PRINT@358
,"BY:ALLAN J. BELANGER":PRINT@39
3,"COPYRIGHT (C)1985"
80 N=0:Z=0:U=0:SP=3:O=0:T=T1:X=1
0:Y=30:V=0:GOSUB360
90 Z=Z+1
100 Q=RND(52):IFB(Q)=1THEN100ELS
EI(Z)=Q:I(Z+20)=Q:B(Q)=1:IFZ<20T
HEN90ELSEGOSUB360
110 Z=Z+1
120 Q=RND(40):IFB(Q)=1THEN120ELS
ECP(Z)=I(Q):B(Q)=1:N=N+1:X1=X+4:
Y1=Y+21:IFN<10THENE=1
130 Q=Z:R=0:GOSUB220:X1=X+4:Y1=Y
+21:GOSUB340:E=2:IFZ<40THEN110EL
SEGOSUB360:DRAW"C2S6BM41,150BU2R
35D8L36U8BD2BR3NR4D2R4D2L4BR7NR4
U4R4BR3R4D4L4U4BR7ND4R4D2L4R2F2B
R3NR4U2NR4U2R4"
140 DRAW"BM157,150BU2R28D8L28U8B
D2BR2R4L2ND4BR4D4R4U4BR3ND4R4D2L
4R2F2BR3U4F4U4"
150 FORZ=1TO2:DRAW"C2S12BM"+STR$
(18+Z)+",12ND3F3E3D3BR4NR4UNR4UR
4BR4BUND3F3E3D3BR4U2R4D2L4BR8NR4
U2R4BR4ND2R4DNL4DBR4U2R4DL4R2FRB
R4U2R3FGL3BR8R4UL4UR4":NEXT:GOSU
B270:GOSUB280:SCREEN1,1
160 FORP=1TO2
170 D(2)=0:D$="":FORZ=1TO2
180 A$=INKEY$
190 IFA$=""THEN180ELSEIFA$<"0" O
RA$>"9" OR(Z=1ANDA$>"4")THEN260E
LSED$=D$+A$:PLAY"T50O4F":NEXTZ:D
(P)=VAL(D$):IFD(P)>40ORD(P)<1ORD
(1)=D(2)THEN260ELSEIFB(D(P))=1TH
EN260ELSEH(P)=CP(D(P)):V=1:GOSUB
210:NEXTP:V=0:IFH(1)=H(2)THENGOS
UB390:U=1:GOSUB270
200 FORP=1TO100*A:NEXT:FORP=1TO2
```

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters.* So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time.* Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited. (Add $2 for shipping. Californians add 6% state tax.)

Available at
Radio Shack stores
via express order
catalogue #90-0253
90-0254

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

```
:GOSUB210:NEXT:GOSUB280:U=0:GOTO
160
210 C=H(P):Q=D(P):R=0:IFU=1THENB
(D(P))=1
220 IFQ>10THENR=R+1:Q=Q-10:GOTO2
20ELSEX=10+(20*Q):Y=30+(28*R)
230 S=1
240 IFC>13THENS=S+1:C=C-13:GOTO2
40ELSECOLOR1:LINE(X,Y)-(X+16,Y+1
9),PSET,BF:IFV=0THEN250ELSEDRAW"
S4C2BM"+STR$(X+3)+","+STR$(Y+2)+
C$(C):DRAW"BM"+STR$(X+7)+","+STR
$(Y+14)+S$(S):RETURN
250 COLORU:LINE(X,Y)-(X+16,Y+19)
,PSET,B:LINE(X+3,Y+2)-(X+13,Y+17
),PSET,BF:RETURN
260 PLAY"T15O2D":GOTO170
270 O=2:SP=4:N=SC:COLOR2:LINE(93
,147)-(135,159),PSET,BF:X1=96:Y1
=150:GOSUB340:RETURN
280 O=2:SP=4:T=T-1:N=T:X1=202:Y1
=150:COLOR2:LINE(200,147)-(216,1
59),PSET,BF:GOSUB340
290 IFT=0THEN370ELSEFORZ=1TO40:I
FB(Z)=0THENRETURNELSENEXTZ:FORZ=
1TOT:PLAY"T10G":SC=SC+10:GOSUB27
0:NEXTZ:T1=T1-5:SCREEN1,0:GOTO80
300 C$(1)="BRNGR3FD2GL3GD2R5BU7B
R":C$(2)="BRNGR3FDGNLFD2GL3HBR6B
U6":C$(3)="BD4NE4R5LD3U7BR2":C$(
4)="NR5D3R4FD2GL3HBR6BU6":C$(5)=
"BRR3FHL3GD5FR3EU2HL3GBU4BR5"
310 C$(6)="NDR5DG3D3BR4BU7":C$(7
)="BRNGR3FDGNL3FD2GL3HU2EHUBEBR5
":C$(8)="BRNR3GD2FR3EU2HFD5GL3NH
BR5BU7":C$(9)="BLNGD7BR3HU5ER3FD
5GL3":C$(10)="BLBD6NUR4U6LR2":C$
(11)="R4D6NHL4NU6R5ND":C$(12)="D
6U3RNE3F3":C$(13)="BDER3FHL3GD3N
R5D3BR5U6"
320 N$(0)="NR4D6R4U6":N$(1)="BR2
ND6":N$(2)="R4D3L4D3R4BU6":N$(3)
="R4D3NL4D3NL4U6":N$(4)="D3R4U3N
D6":N$(5)="NR4D3R4D3NL4BU6":N$(6
)="NR4D6R4U3NL4BU3":N$(7)="R4ND6
":N$(8)="R4D6L4U3NR4U3R4":N$(9)=
"NR4D3R4U3D6NL4U6"
330 S$(1)="BLERFDGLHUBE3ERFDGLHU
BF3ERFDGLHUBLD4LU4BR3D2E2L2BL5D2
H2R2BE3D2H2R2":S$(2)="E4F4DGLH2N
D4NU2G2LHUBRE3F3GH2G2HEND3R4D3E2
BL6D2H2":S$(3)="E4F4G4H4":S$(4)=
"BUE2F2E2F2DG4H4U":RETURN
340 POKE178,O:Q$=STR$(N):FORQ=E
TOLEN(Q$):M=VAL(MID$(Q$,Q,1)):DR
AW"S"+STR$(SP)+"BM"+STR$(X1)+","
+STR$(Y1)+N$(M):IFM=1ANDSP=3THEN
X1=X1+SP+2ELSEX1=X1+(SP*2)
350 NEXTQ:RETURN
360 FORZ=1TO52:B(Z)=0:NEXT:Z=0:R
ETURN
370 FORZZ=1TO40:IFB(ZZ)=0THENPLA
Y"T4AGAT1F":V=1:FORZ=1TO40:C=CP(
Z):R=0:Q=Z:GOSUB220:NEXTZ:SC=0:T
1=61ELSENEXTZZ:T1=T1-5:SCREEN1,0
:GOTO80
380 IFINKEY$=""THEN380ELSE70
390 PLAY"T10O3AGDEFGDGEAAGDEGF":
SC=SC+((C+1)*2):RETURN
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

Hint . . .

Circuit Solution

When my tape recorder began giving me numerous I/O Errors, I began to look for the cause. It appears the dropping resistor in the aux input circuit of the recorder had "gone high." This resulted in marginal program saves. I replaced the resistor with one of the proper value and all is well now. So, if you are technically minded and the usual head alignment adjustment doesn't do the trick, you might check for this possibility.

Theodore Looman
Sacramento, CA

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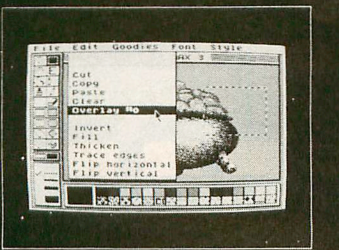
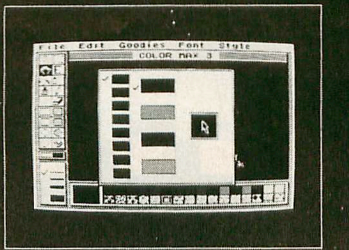
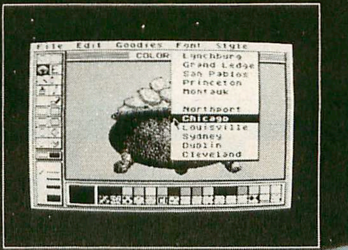
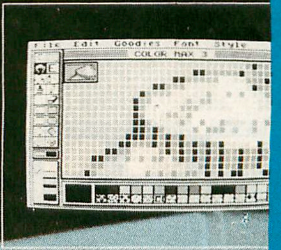
NEW COCO 3 SOFTWARE


File Edit Goodies Font Style
Cut
Copy
Paste
Clear
Overlay Mo
Invert
Fill
Thicken
Trace edges
Flip horizontal
Flip vertical


File Edit Goodies Font Style
COLOR MAX 3


File Edit Goodies Font Style
COLOR
Lynchburg
Grand Ledge
San Pablo
Princeton
Montauk
Northport
Chicago
Louisville
Sydney
Dublin
Cleveland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COLOR MAX 3

INTRODUCING

COLOR MAX 3

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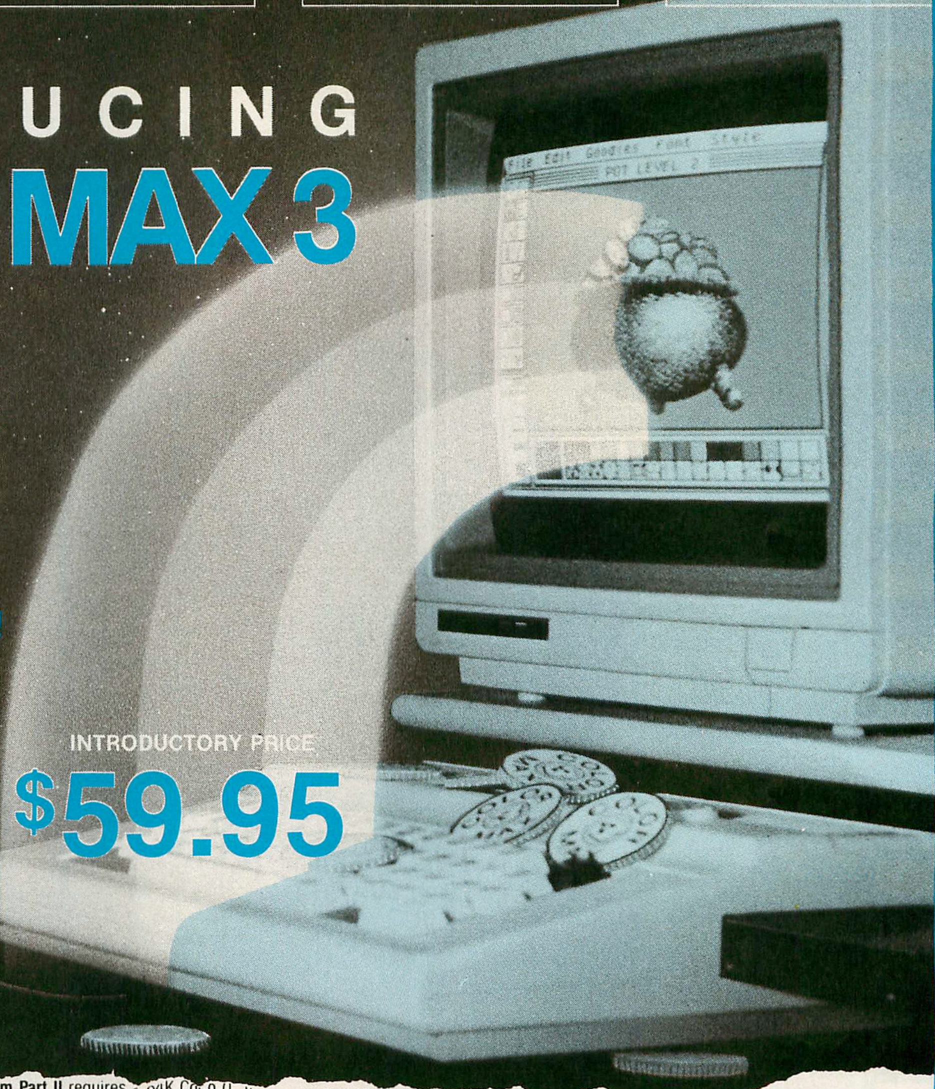
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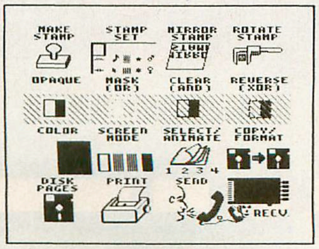
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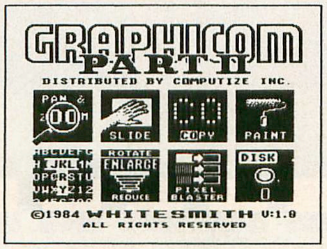
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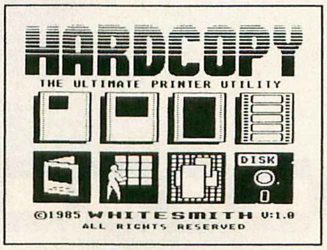
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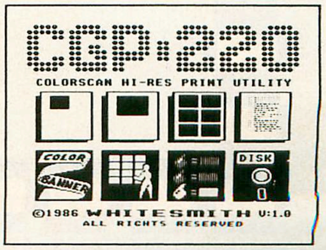
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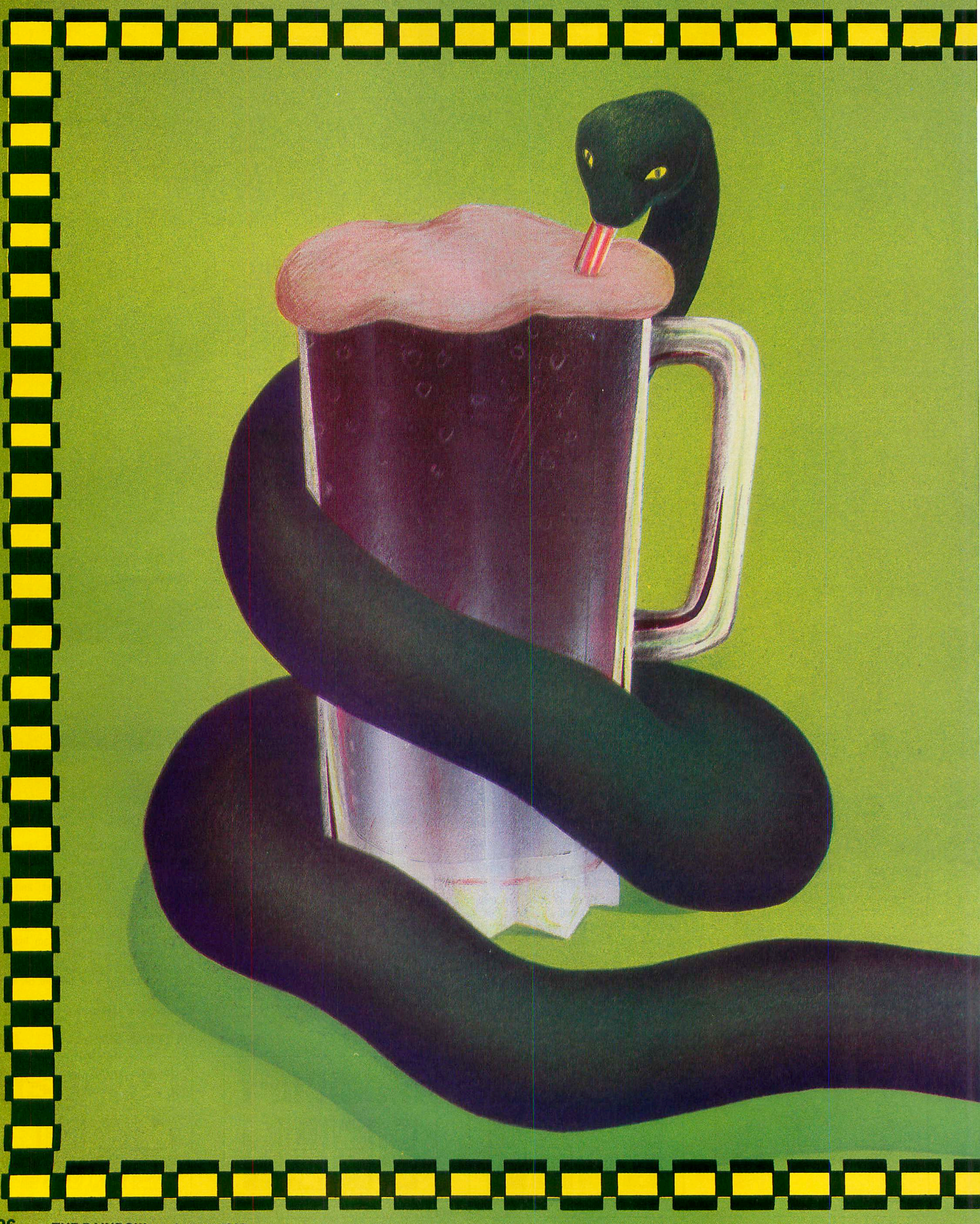


32K
ECB

SNEAKY SNAKE

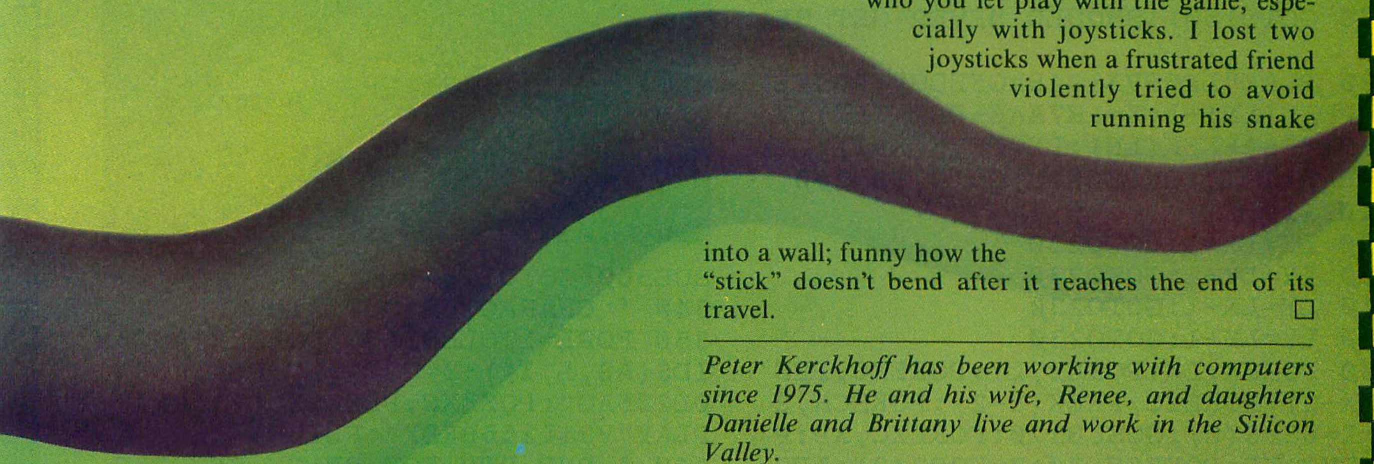
by Peter Kerckhoff

Sneaky Snake is a colorful game with sound effects the whole family can enjoy. You lead a snake around on the screen looking for root beer, avoiding snake pits and tying your snake into a knot. It requires a 32K Color Computer, a disk drive, and, as an option, a joystick.

Type in the program from the listing and save it to your disk as `SNEAKY`. Be careful typing in lines 780 on, as these lines contain the data needed to generate the machine language portion of *Sneaky Snake.* Most of the program is written in BASIC, but where quick response is needed, machine language is used.

When you've copied *Sneaky Snake* onto your disk, plug a joystick into the left joystick port (if you don't have a joystick, you can elect to use the arrow keys on the keyboard) then type `RUN "SNEAKY"` to start the program. The screen will display the opening graphics while the computer pokes in the machine language program. Once the machine language program is in memory, the rules and objectives of *Sneaky Snake* will be displayed. Follow the instructions on the screen. In general, the rules and objectives are to guide your snake around on the screen using the joystick (or keyboard), trying to lead the snake to the little blue mugs of root beer, avoiding the red snake pits. Hitting a mug of root beer causes your snake to grow one body length; hitting a snake pit causes your snake to shrink one body length. The game ends if you run your snake into a wall (outside edges of the play field) or tie your snake into a knot (run the snake over itself). As you will quickly learn, short snakes are easy to guide around the screen, but long snakes can be difficult.

I hope you enjoy *Sneaky Snake*. Be careful about who you let play with the game, especially with joysticks. I lost two joysticks when a frustrated friend violently tried to avoid running his snake into a wall; funny how the "stick" doesn't bend after it reaches the end of its travel. □

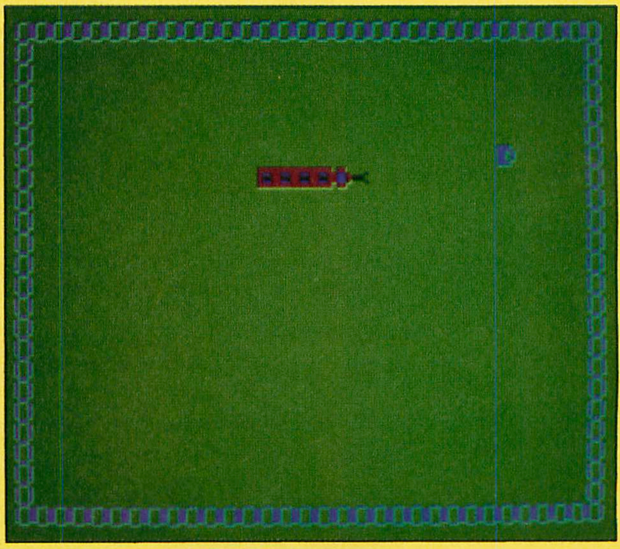


Peter Kerckhoff has been working with computers since 1975. He and his wife, Renee, and daughters Danielle and Brittany live and work in the Silicon Valley.

170 223	710 156
270 88	750 224
380 214	830 15
500 105	880 45
570 13	END 41
640 210	

The listing: SNEAKY

```
10 '
20 '
30 '      SNEAKY SNAKE   VR 2.1
40 '
50 '
60 ' COPYRIGHT (C) 1982
70 ' BY PETER KERCKHOFF
80 ' REV. 6/86 P.KERCKHOFF
90 '
100 CLEAR1390,&H7A9F:SP=0:SR=3:G
OSUB680:GOSUB440:GOSUB490:DIMA(7
)
110 POKEXC,10:POKEYC,10:A$=CHR$(
29)+CHR$(28)+CHR$(24):GOSUB350:G
OSUB370:POKECH,30:POKEXC,XP:POKE
YC,YP:Z=USR3(Z):IFSP=1THENGOSUB3
70:POKECH,31:POKEXC,XP:POKEYC,YP
:Z=USR3(Z)
120 X=&H7AA0:POKEX,10:POKEX+1,11
:POKEX+2,12:X=&H7B68:POKEX,10:PO
KEX+1,10:POKEX+2,10:POKEM,1:POKE
LN,2:A$=INKEY$
130 X=JOYSTK(0):X=JOYSTK(2):Y=JO
YSTK(3):A$=INKEY$:IFPEEK(J)=0AND
A$<>""THEN150
140 IF(X<5ORY<5ORX>58ORY>58)ANDP
EEK(J)=1THEN150ELSE130
150 PLAY"AG":Z=USR1(Z):FORX=0TO5
0STEPSR:NEXT:IFPEEK(G)=1THEN150
160 ONPEEK(G)GOTO170,180,260,300
,310
170 GOTO150:'SHOULD NEVER GET HE
RE
180 PLAY"L255V31O4BAGFEDC":POKEL
N,PEEK(LN)+1:X=&H7AA0+PEEK(LN):Y
=&H7B68+PEEK(LN):LX=PEEK(X-1):LY
=PEEK(Y-1):ONPEEK(M)GOTO190,200,
210,220
190 LX=LX+1:GOTO230
200 LY=LY-1:GOTO230
210 LX=LX-1:GOTO230
220 LY=LY+1:GOTO230
230 POKEX,LX:POKEY,LY:POKEXC,PEE
K(X-2):POKEYC,PEEK(Y-2):POKECH,2
9:Z=USR3(Z):GOSUB370:POKEXC,XP:P
OKEYC,YP:POKECH,30:Z=USR3(Z):IFS
P=1THENGOSUB370:POKEXC,XP:POKEYC
,YP:POKECH,31:Z=USR3(Z)
240 IFPEEK(LN)<200THEN150:' MAXI
MUM SNAKE LENGTH = 200
250 A$="YOU HAVE OBTAINED A MEGA
-SNAKE":POKEXC,0:POKEYC,0:GOSUB3
50:A$="THE SNAKE LENGTH IS 200!!
!":POKEXC,0:POKEYC,0:GOSUB350:GO
SUB540:GOTO110
260 A$="BFBFBFBF":PLAY"L100O1V31
XA$;V15XA$;V7XA$;V3XA$;V2XA$;V1X
A$;V0XA$;V31O4L255"
270 XP=PEEK(&H7AA0+PEEK(LN)):YP=
PEEK(&H7B68+PEEK(LN)):POKEXC,XP:
POKEYC,YP:POKECH,32:Z=USR3(Z)
280 X=PEEK(LN)-1:IFX<2THENX=2
290 POKELN,X:GOTO150
300 A$="YOU HAVE TIED YOUR SNAKE
 INTO A":B$="KNOT...LENGTH WAS":
GOTO320
310 A$="YOU HAVE RUN YOUR SNAKE
INTO A":B$="WALL...LENGTH WAS"
320 POKEXC,0:POKEYC,0:GOSUB350:A
$=B$+STR$(PEEK(LN)+1)+".":POKEXC
,0:POKEYC,1:GOSUB350:POKEXC,0:PO
KEYC,3:A$="PRESS TRIGGER FOR SAM
E GAME":GOSUB350:POKEXC,0:POKE Y
C,4:A$="OR PRESS ENTER FOR NEW S
ET-UP":GOSUB350
330 A$=INKEY$:Z=PEEK(&HFF00)AND2
:IFA$=""ANDZ=2THEN330 ELSE IF Z=
0 THEN GOSUB620:GOTO 110 ELSE GO
SUB560:GOTO110
340 ' CHARACTER OUT RTN
350 FORL=1TOLEN(A$):POKECH,ASC(M
ID$(A$,L,1)):Z=USR3(Z):PLAY"O4V1
0L255AG":POKEXC,PEEK(XC)+1:NEXT:
PLAY"V31L255BFBF":RETURN
360 ' RND RTN FOR RB OR SNK PIT
370 XP=RND(27)+2:YP=RND(18)+2:AP
=&H0E00+YP*256+XP:IFPEEK(AP)<>0T
```



```
HEN370ELSEA(0)=AP+1:A(1)=AP+256:
A(2)=AP-256:A(3)=AP-1:A(4)=AP+2:
A(5)=AP+512:A(6)=AP-512:A(7)=AP-
2
380 Y=&H0600+PEEK(&H7B68+PEEK(LN
))*256+PEEK(&H7AA0+PEEK(LN)):FOR
X=0TO7:IFY=A(X)THEN370ELSENEXTX:
RETURN
390 RESTORE:CLS
400 READ A$:PRINT@0,A$;" ";:IFA$
<>"*"THEN400ELSECLS
410 READA$:PRINTA$;"-";
420 IFINKEY$<>" "THEN420ELSE410
430 A$=INKEY$:IFA$=""THEN430ELSE
PRINTHEX$(ASC(A$)):GOTO430
440 RESTORE:AD=&H7DD0
450 READD$:IFD$<>"*"THENPOKEAD,V
AL("&H"+D$):AD=AD+1:GOTO450
460 AD=&H7C3A:DEFUSR1=&H7C3E:DEF
USR3=&H7D7E:YC=&H7C37:XC=YC+1:CH
=XC+1:LN=&H7C31:POKELN-1,0:M=LN+
1:J=M+1:G=J+1:POKEJ,1
470 READD$:IFD$<>"*"THENPOKEAD,V
AL("&H"+D$):AD=AD+1:GOTO470
480 RETURN
490 PMODE3,1:SCREEN1,0:PCLS:LINE
(0,0)-(255,191),PSET,B:LINE(4,4)
-(251,187),PSET,B:POKEYC,2:POKEX
C,10:A$="SNEAKY SNAKE":GOSUB350
500 POKEXC,3:POKEYC,4:A$="WELCOM
E TO THE GAME SNEAKY":GOSUB350:P
OKEXC,1:POKEYC,5:A$="SNAKE. THE
OBJECT OF THIS GAME":GOSUB350:PO
KEXC,1:POKEYC,6:A$="IS TO GUIDE
YOUR SNAKE ( "+CHR$(29)+CHR$(29)
+CHR$(28)+CHR$(24)+")":GOSUB350
510 POKEYC,7:POKEXC,1:A$="TO THE
 MUG OF ROOTBEER ( "+CHR$(30)+"
),":GOSUB350:POKEYC,8:POKEXC,1:A
$="AVOIDING THE SNAKE PITS ( "+C
HR$(31)+" ).":GOSUB350:POKEYC,10
:POKEXC,1:A$="YOUR SNAKE WILL GR
OW LONGER AS":GOSUB 350
520 POKEYC,11:POKEXC,1:A$="IT DR
INKS THE ROOTBEER--BUT IF":GOSUB
350:POKEYC,12:POKEXC,1:A$="THE S
NAKE FALLS INTO A SNAKE":GOSUB35
0:POKEYC,13:POKEXC,1:A$="PIT THE
 SNAKE WILL SHRINK.":GOSUB350
530 POKEYC,15:POKEXC,4:A$="THE G
AME ENDS IF YOU TIE":GOSUB350:PO
KEYC,16:POKEXC,1:A$="YOUR SNAKE
INTO A KNOT OR LEAD":GOSUB350:PO
KEYC,17:POKEXC,1:A$="IT INTO A W
ALL.":GOSUB350:PLAYTN$
540 POKEYC,21:POKEXC,4:A$="PRESS
 ANY KEY TO CONTINUE":GOSUB350:A
```

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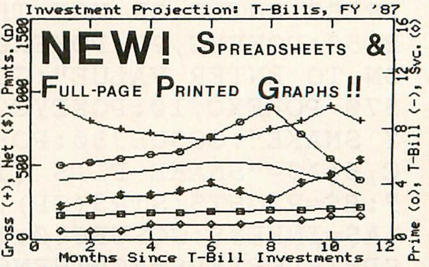

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```
$=INKEY$
550 Z=PEEK(&HFF00)AND2:IF INKEY$
="" AND Z=2 THEN 550
560 PCLS:POKEXC,2:POKEYC,21:A$="
PRESS ENTER OR USE TRIGGER":GOSU
B350:POKEYC,22:POKEXC,2:A$="BUTT
ON TO ENTER VALUE":GOSUB350
570 POKEXC,10:POKEYC,2:A$="SNEAK
Y SNAKE":GOSUB350:POKEXC,2:POKEY
C,6:A$="SNAKE PITS (1=YES 0=NO)
":B$=RIGHT$(STR$(SP),1):GOSUB350
:A$=INKEY$:GOSUB640:IFB$="1"THEN
SP=1ELSEIFB$="0"THENSP=0
580 POKEYC,8:POKEXC,2:A$="SNAKE
SPEED (1 TO 5) ":B$=RIGHT$(STR$(
SR),1):GOSUB350:A$=INKEY$:GOSUB6
40:IFB$>"0"ANDB$<"6"THENSR=VAL(B
$):POKEYC,10:POKEXC,2:A$="KEYBOA
RD (0) OR":GOSUB350
590 POKEYC,11:POKEXC,2:A$="JOYST
ICK (1)    ":B$=RIGHT$(STR$(PEEK
(J)),1):GOSUB350:A$=INKEY$:GOSUB
640:POKEJ,0:IFB$="1"THENPOKEJ,1
600 POKEYC,14:POKEXC,2:A$="** PR
ESS ANY KEY TO START **":GOSUB35
0:A$=INKEY$
610 Z=PEEK(&HFF00)AND2:IF INKEY$
="" AND Z=2 THEN 610
620 PCLS:POKECH,23:FORX=0TO31:PO
KEXC,X:POKEYC,0:Z=USR3(Z):POKEYC
,23:Z=USR3(Z):NEXT:FORX=0TO23:PO
KEXC,0:POKEYC,X:Z=USR3(Z):POKEXC
,31:Z=USR3(Z):NEXT:RETURN
630 'KEYBOARD INPUT
640 POKECH,ASC(B$):Z=USR3(Z)
650 A$=INKEY$:Z=PEEK(&HFF00)AND2
:IF A$="" AND Z=2 THEN 650 ELSE
IF Z=0 THEN RETURN ELSE IFA$=""T
HEN650ELSEIFA$>"/"ANDA$<":"THENP
LAY"V31L255B":B$=A$:GOTO640ELSER
ETURN
660 GOTO660
670 ' TITLE PAGE GRAPHICS
680 PMODE4,1:SCREEN1,1:PCLS1:DRA
W"BM15,84C0S8F3R7E2U6H2L3H2U2E2R
2E5R4E2U6H2L3H2UE2R2E2R2U3EUDRLG
L3D2GL3G3D4F2R3F2D2G2L3G5L2G3D5F
2R3F2D2G2L5H3D2"
690 DRAW"BM+14,+3U8R2F5U5R2D8L2H
5D5L2BM+11,+0U6E2R2F2D6L2U2L2D2L
2BM+2,-3R2U2L2D2BM+6,+3U8R2D4E4R
2G4F4L2H3GD2L2BM+16,+0L6U8R6DL4D
3R2DL2D2R4DBM-27,-21U8R2F5U5R2D8
L2H5D5L2BM+11,+0U8R6DL4D3R2DL2D2
R4DL6BM+8,+0U6E2R2F2D6L2U2L2D2L2
BM+2,-3"
700 DRAW"R2U2L2D2BM+6,+3U8R2D4E4
R2G4F4L2H3GD2L2BM+13,+0U4H3UR2F2
E2R2DG3D4L2":CIRCLE(180,100),20,
0,.2:LINE(160,100)-(160,130),PRE
SET:LINE(200,100)-(200,105),PRES
ET:CIRCLE(180,130),20,0,.2,0,.5:
LINE(160,130)-(160,140),PRESET
710 LINE(200,130)-(200,140),PRES
ET:CIRCLE(180,140),20,0,.2,0,.5:
LINE(195,108)-(210,104),PRESET:L
INE(195,130)-(210,126),PRESET:LI
NE(210,104)-(210,126),PRESET:LIN
E(195,113)-(205,110),PRESET:LINE
(195,125)-(205,122),PRESET:LINE(
205,110)-(205,122),PRESET
720 LINE(200,112)-(200,122),PRES
ET:FORX=9TO27STEP9:LINE(159+X,10
9)-(159+X,126),PRESET:LINE(158+X
,111)-(158+X,124),PRESET:NEXT:PR
ESET(55,12):PRESET(53,10)
730 FORX=1TO10:XC=X*4+160:YC=100
-RND(10):LINE(XC-1,YC)-(XC+1,YC)
,PRESET:LINE(XC,YC-1)-(XC,YC+1),
PRESET:NEXT
740 DRAW"BM5,110S12RULU2D3BM+2,-
1FUD2LBM+4,-1S8U5R2D2L2BM+5,+3L2
URLUR2BM+2,+0R2LD2BM+5,+0L2URLUR
2BM+3,+0LD2URFHUBM+7,+2H3D3U5D2E
2BM+5,+5L2URLUR2BM+2,+2U2RDLRFBM
+3,+0LU2RBM+3,+2HEGDU5BM+3,+0D5U
2R2D2BM+2,+0U2R2D2L2BM+4,+0U5RBM
+3,+0LD5BM-4,-3R6"
750 DRAW"BM30,190S8HU3ER2FD3GL2B
M+5,+0U5F5U5BM+5,+0L3D2R2L2D3R3B
M+5,+0U5F2E2D5BM+3,+0HU3ER2FD3GL
2BM+5,+0U5F2E2D5BM+5,+0L3U3R2L2U
2R3BM+2,+5U5F5U5BM+2,+0R4L2D5BM+
7,+0U5R3D3L3BM+5,-3D5R3BM+5,+0L3
U3R2L2U2R3BM+2,+5U3E2F2DL4R4D2BM
+2,+0R3U3L3U2R3BM+5,+0L3"
760 DRAW"D2R2L2D3R3":TN$="V31T5O
3L4CDL2E-DCL4CDE-FDE-L2CL4GGGGGA
-GFDE-FFFGFE-L4CDL2E-DCL4CDE-FDE
-L2CP8T2O4L255P8":RETURN
770 ' CHARACTER FONT TABLE
780 DATA28,82,82,82,82,82,82,28,
0,0,3,FC,FC,3,0,0,0,33,33,3F,C,C
,C,C,0,0,C0,3F,3F,C0,0,0,C,C,C,C
,3F,33,33,0,14,14,69,69,69,69,14
,14,55,55,69,7D,7D,69,55,55,A8,A
8,AA,A2,A2,A2,A8,A8,3C,FF,FF,FF,
FF,FF,FF,3C
790 DATA 0,0,0,0,0,0,0,0,4,4,4,4
,4,0,4,0,11,11,11,0,0,0,0,0,0,0,
0,0,0,0,0,0,4,15,10,4,1,15,4,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,4
,4,4,0,0,0,0,0,1,4,4,4,4,4,1,0
800 DATA10,4,4,4,4,4,10,0,0,11,4
```

```
,15,4,11,0,0,0,0,4,15,4,0,0,0,0,
0,0,0,1,1,4,0,0,0,0,15,0,0,0,0,0
,0,0,0,0,4,4,0,1,4,4,4,4,4,10,0,
4,11,11,11,11,11,4,0,4,14,4,4,4,
4,15,0
810 DATA15,1,1,15,10,10,15,0,15,
1,1,5,1,1,15,0,11,11,11,15,1,1,1
,0,15,10,10,15,1,1,15,0,15,10,10
,15,11,11,15,0,15,1,1,1,1,1,1,0,
15,11,11,15,11,11,15,0,15,11,11,
15,1,1,15,0,0,4,4,0,4,4,0,0
820 DATA0,1,1,0,1,1,4,0,0,1,1,4,
4,1,1,0,0,0,15,15,0,0,0,0,0,10,1
0,4,4,10,10,0,4,11,11,1,4,0,4,0,
0,0,0,0,0,0,0,0,15,11,11,11,15,1
1,11,0,14,11,11,14,11,11,14,0,5,
10,10,10,10,10,5,0
830 DATA14,11,11,11,11,11,14,0,1
5,10,10,14,10,10,15,0,15,10,10,1
4,10,10,10,0,15,10,10,11,11,11,5
,0,11,11,11,15,11,11,11,0,15,4,4
,4,4,4,15,0,1,1,1,1,11,15,4,0,11
,11,14,14,11,11,11,0,10,10,10,10
,10,10,15,0
840 DATA11,15,15,11,11,11,11,0,1
4,15,11,11,11,11,11,0,15,11,11,1
1,11,11,15,0,15,11,11,15,10,10,1
0,0,4,11,11,11,11,15,5,0,15,11,1
1,15,14,11,11,0,15,10,10,15,1,1,
15,0,15,4,4,4,4,4,4,0,11,11,11,1
1,11,11,15,0
850 DATA11,11,11,11,11,11,4,0,11
,11,11,11,15,15,11,0,11,11,11,4,
11,11,11,0,11,11,11,11,4,4,4,0,1
5,1,1,15,10,10,15,0,*
860 ' MACHINE CODE FOLLOWS
870 DATAEF,DF,F7,BF,B6,7C,33,26,
1B,C6,4,8E,7C,3A,A6,80,B7,FF,2,B
6,FF,0,84,8,27,5,5A,26,F1,20,26,
F7,7C,32,20,21,BD,A9,DE,B6,1,5D,
C6,2,81,5,23,EF,C6,4,81,3A,24,E9
,B6,1,5C,C6,3,81,5,23,E0,C6,1,81
,3A,24,DA,CC,7A,A0
880 DATAF3,7C,30,1F,1,A6,84,B7,7
C,36,CC,7B,68,F3,7C,30,1F,1,A6,8
4,B7,7C,35,B6,7C,32,81,1,26,5,7C
,7C,36,20,19,81,2,26,5,7A,7C,35,
20,10,81,3,26,5,7A,7C,36,20,7,81
,4,26,3,7C,7C,35,CC,E,0,F3,7C,35
,1F,1,A6,84,C6,5,81,28,27,10,5A,
81,55,27,B,5A,81,3C,27,6
890 DATA5A,81,A8,27,1,5A,F7,7C,3
4,8E,7A,A0,A6,84,B7,7C,38,8E,7B,
68,A6,84,B7,7C,37,86,20,B7,7C,39
,BD,7D,7E,CC,7A,A0,F3,7C,30,1F,1
,A6,84,B7,7C,38,CC,7B,68,F3,7C,3
0,1F,1,A6,84,B7,7C,37
900 DATA86,1C,B7,7C,39,BD,7D,7E,
7A,7C,31,CC,7A,A0,F3,7C,30,1F,1,
A6,84,B7,7C,38,CC,7B,68,F3,7C,30
,1F,1,A6,84,B7,7C,37,86,1D,B7,7C
,39,BD,7D,7E,7C,7C,31,B6,7C,32,8
B,17,B7,7C,39,B6,7C,36,B7,7C,38,
B6,7C,35,B7,7C,37,BD,7D,7E,8E,7A
,A0,10,8E,7B,68,F6,7C,31
910 DATA12,A6,1,A7,80,A6,21,A7,A
0,5A,26,F5,B6,7C,36,A7,0,B6,7C,3
5,A7,20,39,12,12,12
920 DATA F6,7C,39,86,8,3D,C3,7D,
18,1F,1,FC,7C,37,C3,E,0,1F,2,A6,
80,A7,A4,A6,80,A7,A8,20,A6,80,A7
,A8,40,A6,80,A7,A8,60,A6,80,A7,A
9,0,80,A6,80,A7,A9,0,A0,A6,80,A7
,A9,0,C0,A6,80,A7,A9,0,E0,39,*
```

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Approaches for Lifelong Learning

By Michael Plog, Ph.D.
Rainbow Contributing Editor

Too often, we think of education as something only for young people. Sometimes we expand our definition of education to college students. The truth is that we learn at any age, indeed at all ages. Instead of thinking just about young people, consider for a moment the adult learner, especially the adult in need of computer education.

Adult learners come in all types. For example, many businesses offer computer training for employees. Most of these programs are oriented toward specific applications, such as word processing, database manipulation, spreadsheets, or a general orientation to computers. Many times, the learner (company employee) is only taught enough to start a computer, run the specific application, and get out of the task. In some cases, training is severely limited to job-specific applications. For example, some businesses only want employees to update information in a database file. Training is limited only to how updating is done. There is no broader learning about databases in general or about how the machine works.

This limited type of training serves a purpose for the business — employees can now complete the tasks assigned to them. It is not, however, much in the way of adult education. The purpose of adult education is the same as the purpose of education for children: to increase the knowledge level of the learner and provide a set of skills that can be used in a variety of situations. Thus, this training is not true education.

There are millions of people who entered the world of computers late. In my own case, it has been over two decades since I was in high school. When I went to high school and college, computers were discussed, but only as powerful machines available to a few and understood by even fewer. I know some people who did not have the opportunity to learn about computers — when micros were on the market — until they were retired!

There are many adults who want to learn some general information about computers, master a few applications, or just increase their knowledge in some specific area. These people represent the need for adult education. Different options exist to satisfy the need. All have advantages; all have disadvantages.

Most adults learn about computers by the informal method. It is impossible to talk with adult computer enthusiasts for very long without hearing the phrase "self-taught." Some people say it with pride; some people say it with an apology. The fact of the matter is that most adult computer users are indeed self-taught in many aspects of their machines. The idea of "self-taught" is a little deceptive, however. Many people have tutors — friends or relatives who provide the basic instruction necessary for continuing education to occur. After the initial introduction, the computer user becomes truly self-taught, learning from books and trial and error.

This approach to computer knowledge is not without merit. People tend to learn more and faster when a topic interests them. Informal learning also centers very quickly on specific areas of major importance to the learner. For example, a person wants to learn about spreadsheets. After a period of agony and review, a spreadsheet is purchased. The user quickly becomes familiar with that package and with spreadsheets in general.

Informal learning does not necessarily mean reliance only on self. Many computer users have friends who pass on information and "tricks" about manipulating the machines. Information is shared freely among hobbyists. The problem is that learning is spotty and incomplete. The informal learner misses many of the details, some of which may be important.

One aspect of informal learning is information shared at conferences. Some people attend RAINBOWfest primarily to talk to other users with similar problems or to ask questions of those with more experience.

There are other options for adult learners besides the informal method.

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in the central office of a school district and is currently employed at the Illinois State Board of Education.

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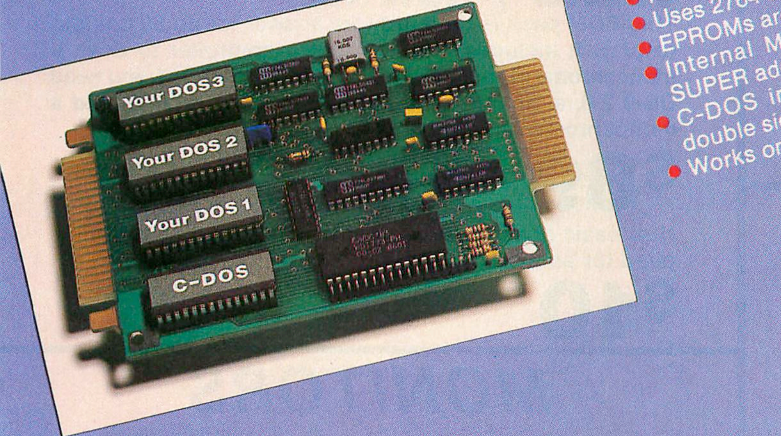

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Other, less informal, training is pro- led by equipment dealers. Tandy still offers classes through Computer Cen- ers for people who buy Tandy equip- nent. The learner must pay a fee for hese classes, but gets continuing sup- ort (including telephone support) from local Center. Other dealers may also ovide training for local markets, but Tandy training is a national institu- n.

Many adult learners have discovered n-credit courses at community (two- ear) colleges. In most states, these stitutions have continuing education adults. Community college admin- trations have discovered that comput- education is a hot-selling topic at resent. All types of students will enroll computer classes. Classes are typi- lly for specific applications, such as SIC instruction or word processing. addition, most community colleges fer a course in beginning computer literacy. The beauty of this somewhat formal education for adult learners is that tuition is often inexpensive, and community colleges are often easy to get to.

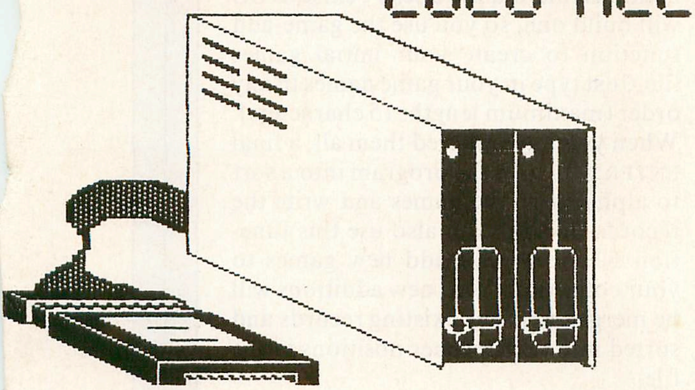
> ***"No matter how much you know about your computer, there is still more to learn."***

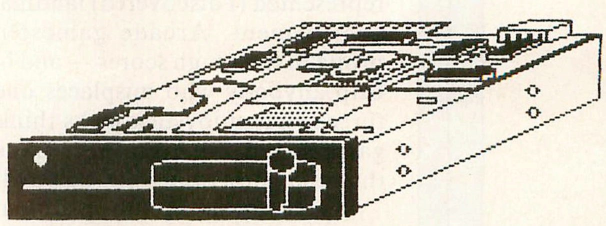
However, adult learners are not limited to community colleges for formal instruction about computers. Private firms are rapidly getting into the act, also. In most towns, you can find private instructors offering classes in computer applications. Adults can attend classes on a variety of topics, from computer literacy to detailed training in specific software packages. Fees for these courses range from downright cheap to outrageous.

Formal instruction is even offered by users clubs. Some of these clubs offer free instruction to members, although others charge a fee for instruction. This seems like an ideal situation for adult learners. Local experts can set up classes for club members on topics of interest. Club members determine the areas of interest.

In order to institute this activity, a fairly large club is necessary. The club needs to be large enough to have more than one expert in several areas. Also, the club would need to have a fairly large pool of members as students. This activity offers benefits for the club, as well as for members. The lure of free or inexpensive adult education can help boost membership.

Education is truly a lifelong activity. No matter how much you know about your computer, there is still more to learn. With the possibilities available to the adult learner, the limits of your education are only what you decide to place on yourself.





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GAME UTILITY

16K
Disk

Keep track of those hard-won scores

Keeping Score With CoCo

By Lou Ashby

Until recently, the area around my computer was a mess. Lots of little bits of paper with cryptic messages, such as "Bill Zaxxon 18000" and "Luanne — Pacatak — 23,450," were scattered all over the place. They represented (I discovered) landmarks of achievement. Arcade gamesters are proud of their high scores — and heaven help anybody who misplaces one! My three resident joystick jocks think their game scores are even more important than the latest issue of RAINBOW!

My solution to this problem is a paper-eating program called *CoCo Scoreboard*. I wrote it, put it on a disk and stuck it in the box with the games disks, and the clutter disappeared. Neatness has returned and errant breezes no longer threaten to disperse the scores of my offspring.

The menu allows you to create the games file, add games, insert or change high scores, and display and print the scoreboard, all from one `LOAD` or `RUN`. Those with only 16K will have to delete lines 10 through 90 and `PCLEAR 1` to avoid an OM Error in the game-add function.

One advantage of direct file organization is that if a file doesn't exist, DOS will build one, so you use the game-add function to create your initial games file. Just type in your game names in any order (maximum length: 15 characters). When you have entered them all, a final ENTER will drop the program into a sort to alphabetize the names and write the records to disk. You also use this function whenever you add new games to your collection. Your new additions will be merged with the existing records and sorted into their proper positions in the file.

The second function allows you to randomly insert or change player names and scores on the game records. At the "Game?" prompt, simply type in the name of the game record you want to update; if it exists, the system will find it, display the current data and prompt for changes.

If no update is to take place to a field, press ENTER and the current data remains. Otherwise, enter the player's name (maximum: 10 letters), press ENTER and type the score at the "Score" prompt. One hint about the score field — it is alphabetic. You can enter non-numeric data (maximum: 10 charac-

---

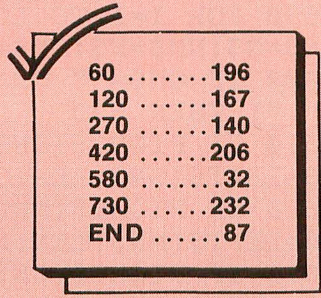
Lou Ashby is an independent computer consultant and an old CoCo nut who enjoys programming in BASIC, FORTH and 6809 assembler. Lou lives in Phoenix, Arizona.

ters), such as times, ratings or scores, with punctuation for better visual impact. Press Q to return to the menu.

The third function displays the scoreboard sequentially on your monitor or TV. This is an ego-builder for one and all — see your name on the screen as best-in-the-house at something.

To prevent excessive wear and tear from looking up scores to see if a new record has been achieved, use Function 4 to print an occasional list for quick reference. This also helps minimize the "oops" factor. Those without a printer might want to keep the code for this feature intact and simply change Line 150 from `ON C GOTO 170, 280, 540, 790` to `ON C GOTO 170, 280, 540, 100`, which will reject entry into hard copy logic until your printer arrives. (You will get one sooner or later!)

Now if I can just design a program that untangles joystick cables. ☐



60 196
120 167
270 140
420 206
580 32
730 232
END 87

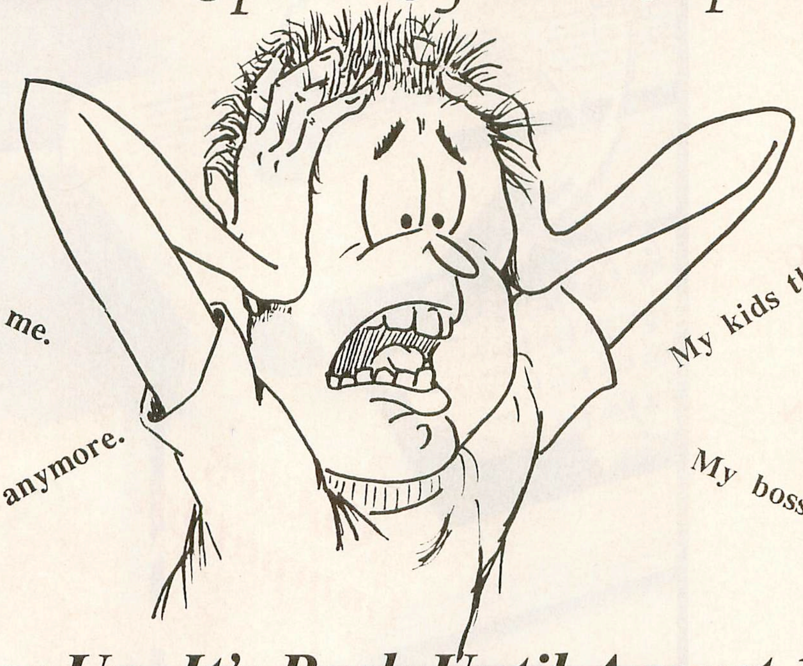
The listing: `SCOREBRD`

```
10 CLEAR350:CLS0:PMODE4,1:PCLS1:
LINE(0,0)-(255,160),PRESET,B
20 DRAW"C0BM2,25F4R12E4U2H4L12H4
U2E4R12NF4BR14D20BR10NU20R16E4U1
2H4NL16BR14NR20D10NR16D10R20BR10
NU20E10F10NU20BR10NU20BR10U20F20
NU20BR10NU20R16E4U12H4NL16BR14NR
20D10NR16D10R20BR10U20R16F4D2G4L
6NL10F10
30 DRAW"C0BM12,55F4R12E4U2H4L12H
4U2E4R12F4BR10ND12E4R12F4D12G4L1
2NH4BR26U10NR16U10R20BR10R10ND20
R10BR10D20E10F10NU20BR10U10NR20U
6E4R12F4D16BR10U20R16F4D2G4L6NL1
0F10BR10NR20U10NR16U10R20
40 DRAW"C0BM12,135ND20R16F4D2G4N
L16BR14BD10U20R16F4D2G4L6NL10F10
BR10NR20U10NR16U10R20BD16BR10F4R
12E4U2H4L12H4U2E4R12NF4BR14NR20D
10NR16D10R20BR10U20F20U20BR10R10
NR10D20BR20BU4F4R12E4U2H4L12H4U2
E4R12F4
50 DRAW"BM70,130NR70U4NR70M+20,-
10NR60U45E2R56NR20F2NR20D45G10D4
M+30,-20U40BL28BD5L44G2D30F2R44E
2U30H2BF10BR10R20U6H4U4E4R4F4D4G
4D16F4D4G4L4H4U4E4U6L20H2E2":PAI
NT(168,87),0,0:PAINT(175,87),0,0
:PAINT(98,77),0,0
60 FORX=80TO138STEP8:CIRCLE(X,12
3),1:CIRCLE(X+5,121),1:CIRCLE(X+
8,119),1:NEXT:CIRCLE(110,85),3,1
:CIRCLE(130,85),3,1:CIRCLE(120,9
5),12,1,.6,1,.5:SCREEN1,1
70 SC$="NF2L6G2D6F2R6E2BR5NU6F2R
6E2U6H2L6G2BR25H2L6G2D6F2R6E2BR5
NU6F2R6E2U6H2L6G2BR35H2L6G2DF2R6
F2DG2L6H2BR25G2L6H2U6E2R6F2BR5D6
F2R6E2U6H2L6NG2BR13ND10R8F2DG2L3
NL5F5BR5NR10U5NR8U5R10BR5ND10R8F
2DG2NL8F2DG2NL8BR7H2U6E2R6F2D6G2
NL6
80 SD$="BR7U5NR10U3E2R6F2D8BR5U1
0R8F2DG2L3NL5F5BR5U10R8F2D6G2L8"
:FORX=30TO31:FORY=170TO171:DRAW"
S4C0BM"+STR$(X)+","+STR$(Y)+SC$:
DRAW SD$:NEXTY,X:T0$="T5P8L4AO+C
O-BAGEL4.CL8DEGFL4EDL1C":T1$="L3
2C+DE-EFF+GG+AA+BO+C"
90 FORO=4TO1STEP-1:PLAY"O"+STR$(
O)+T0$:NEXT:FORO=1TO4:PLAY T1$:N
EXT
100 CLS:PRINT@33,"COCO SCOREBOAR
D IS ON THE AIR."
110 PRINT:PRINTTAB(3);"WHAT WOUL
D YOU LIKE TO DO?"
120 PRINT:PRINT:PRINTTAB(4);"1)
ADD NEW GAMES":PRINTTAB(4);"2) U
PDATE SCORES":PRINTTAB(4);"3) DI
SPLAY THE SCOREBOARD":PRINTTAB(4
);"4) PRINT A SCORE LIST":PRINTT
AB(4);"5) QUIT
130 PRINT:PRINT:PRINTTAB(7);"TAK
E YOUR PICK";:INPUT C$:C=VAL(C$)
140 IF C<1 OR C>5 THEN PRINT:PRI
NTTAB(9);"NOT A CHOICE";:FOR D=0
 TO 800:NEXT D:GOTO 100
150 ON C GOTO 170,280,540,790
160 CLS:END
170 CLS:CLEAR 3500:DIM G$(100):O
PEN "D",#1,"GAMES/DAT",35:FIELD
#1,35 AS GM$:IF LOF(1)=0 THEN 19
0
180 FOR I=1 TO LOF(1):GET #1,I:G
$(I)=GM$:NEXT I
190 INPUT "NAME ";G$:IF G$="" TH
EN 210
200 I=I+1:G$(I)=LEFT$(G$+STRING$
(35," "),35):GOTO 190
210 CLS:PRINT@236,"SORTING":PRIN
T@256,"";
220 FOR J=1 TO I:FOR K=J TO I
230 IF LEFT$(G$(J),15) < LEFT$(G
$(K),15)  THEN 250
240 T$=G$(J):G$(J)=G$(K):G$(K)=T
$:PRINT"* ";
250 NEXT K:NEXT J
260 CLS:PRINT@200,"ONE MOMENT PL
```

```
EASE":PRINT@265,"WRITING TO DISK
"
270 FOR J=1 TO I:LSET GM$ = G$(J
):PUT #1,J:NEXT J:CLOSE #1:GOTO
100
280 CLS:PRINT:PRINT" GAME SCORE
UPDATE"
290 OPEN "D",#1,"GAMES/DAT",35
300 FIELD #1,15 AS G$, 10 AS N$,
 10 AS S$
310 PRINT@128,"GAME";:INPUT GN$:
IF GN$="" THEN CLS:CLOSE:END
320 IF LEN(GN$)<15 THEN GN$=GN$+
" ":GOTO 320
330 IF LEN(GN$)>15 THEN GN$=LEFT
$(GN$,15)
340 F = 1:M = INT((LOF(1)+1)/2):
L = LOF(1):C = 0
350 GET #1,L:IF G$ = GN$ THEN M=
L:GOTO 390
360 GET #1,M:IF C > (LOF(1)+1)/2
 THEN 480
370 IF G$ < GN$ THEN 460
380 IF G$ > GN$ THEN 470
390 CLS:PRINT @ 64, GN$:PRINT @
128, N$:PRINT @ 192, S$
400 PRINT:PRINT:INPUT " PLAYER N
AME";P$
410 IF P$="" THEN P$=N$
420 PRINT:PRINT:LINE INPUT " HIG
H SCORE ";R$
430 IF R$="" THEN R$=S$
440 LSET G$ = GN$:LSET N$ = P$:L
SET S$ = R$:PUT #1,M
450 GOTO 490
460 F = M:M = (M+L)/2:C = C + 1:
GOTO 360
470 L = M:M = (M+F)/2:C = C +1:G
OTO 360
480 CLS:PRINT @ 100,GN$;" NOT FO
UND"
490 PRINT @ 448," TO DO ANOTHER
- PRESS <ENTER>   ELSE PRESS <Q>
"
500 I$=INKEY$:IF I$="" THEN 500
510 IF I$="Q" THEN CLS:CLOSE:GOT
O 100
520 IF I$=CHR$(13) THEN 310
530 GOTO 500
540 CLS5:PRINT@480,STRING$(32,"%
");:PRINT@480,STRING$(9,255);"co
co";CHR$(128);"scoreboard";STRIN
G$(8,255);STRING$(32,"%");
550 FOR N=1TO11:PRINT@480,STRING
$(32,207);:GOSUB 760:NEXT
560 A$="ALPHA":GOSUB720:A$="TO":
GOSUB720:A$="ZAXXON":GOSUB720:A$
="SEE WHO'S BEST AT WHAT . . . "
:GOSUB720
570 OPEN "D",#1,"GAMES/DAT",35
580 FIELD #1,15 AS G$, 10 AS N$,
 10 AS S$
590 FOR I=1 TO LOF(1):GET #1,I:G
N$=G$:NN$=N$:SN$=S$
600 IF GN$="" OR GN$=STRING$(15,
" ") THEN 690
610 IF RIGHT$(GN$,1)=" " THEN GN
$=LEFT$(GN$,LEN(GN$)-1):GOTO 610
620 IF RIGHT$(NN$,1)=" " THEN NN
$=LEFT$(NN$,LEN(NN$)-1):GOTO 620
630 IF RIGHT$(SN$,1)=" " THEN SN
$=LEFT$(SN$,LEN(SN$)-1):GOTO 630
640 P=192+((32-LEN(GN$))/2):PRIN
T@P,GN$;
650 P=256+((32-LEN(NN$))/2):PRIN
T@P,NN$;
660 P=320+((32-LEN(SN$))/2):PRIN
T@P,SN$;
670 FOR DY=0 TO 2000:NEXT DY
680 PRINT@192,STRING$(32,207);:P
RINT@256,STRING$(32,207);:PRINT@
320,STRING$(32,207);
690 NEXT I
700 PRINT@202,"THAT'S ALL";:FORW
=0TO2000:NEXTW
710 CLOSE:GOTO100
720 S=224:P=255:D=0
730 IF D<>LEN(A$) THEN D=D+1:B$=
B$+MID$(A$,D,1)
740 IF P=S THEN B$=RIGHT$(B$,LEN
(B$)-1) ELSE P=P-1
750 PRINT@P,B$+CHR$(207);
760 PLAY"T25O"+STR$(RND(5))+"N"+
STR$(RND(12))
770 FORW=1TO10:NEXTW
780 IF B$="" THEN RETURN ELSE 73
0
790 PRINT#-2,"    <<< THE COCO S
COREBOARD >>>":PRINT#-2," "
800 PRINT #-2,"GAME
 PLAYER        SCORE":PRINT#-2,"
"
810 OPEN "D",#1,"GAMES/DAT",35
820 FIELD #1,15 AS G$, 10 AS N$,
 10 AS S$
830 FOR I=1 TO LOF(1):GET #1,I:P
RINT #-2,G$;"   ";N$;"   ";S$:NE
XT I
840 CLOSE #1:GOTO 100
```

Oh No!

I Missed The Speech Systems Super Sale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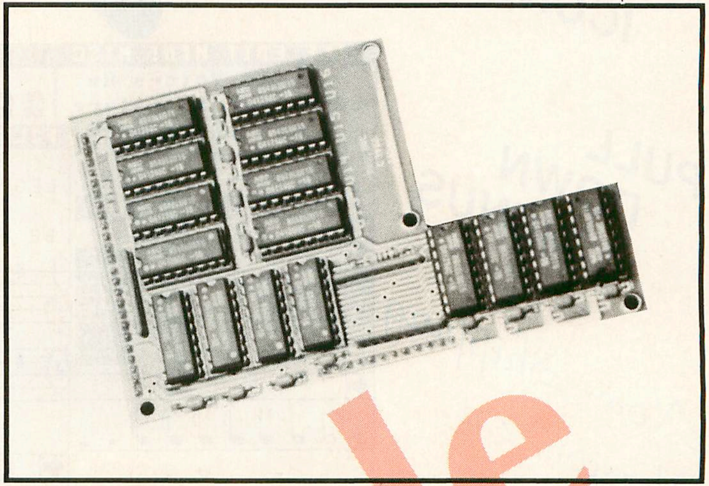

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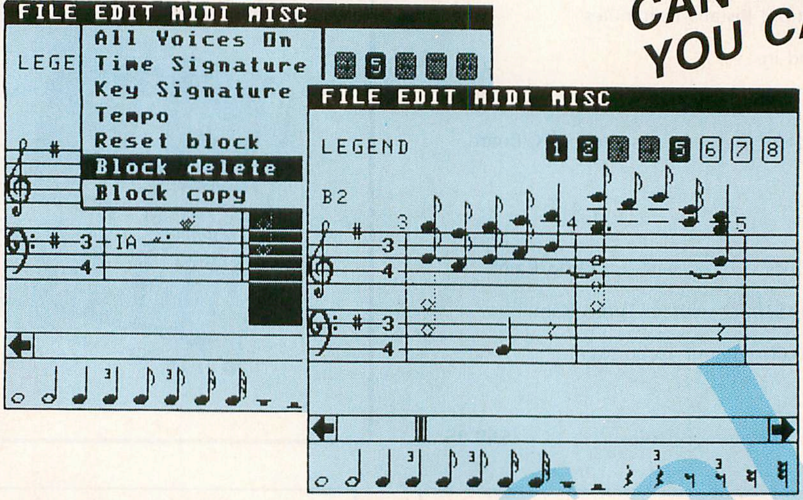

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- Automatically inserts bar for each measure as you compose.
- Key signature lets you specify sharps and flats only once, LYRA will do the rest.
- Plays MUSICA 2 files using LYRA CONVERT (#LC164).
- Each voice may be visually highlighted or erased.
- Each measure is numbered for easy reading.
- Solo capability
- Block edits are highlighted.
- Tie notes together for musical continuity.
- Name of note pointed to is constantly displayed.
- Jump to any point in the score instantaneously.
- Memory remaining clearly displayed, however you will have plenty of memory even for the most demanding piece.
- Help menu makes manual virtually unnecessary.
- LYRA is 100% software, no need for extra hardware unless you want more power.
- Music easily saved to tape or disk.
- Requires 64K and mouse or joystick.

LYRA (Disk only) #LY122 . . . . **$54.95**

LYRA OPTIONS

These LYRA options are **not** required. They are provided for those wishing additional flexibility.

LYRA CONVERT

A program to convert MUSICA 2 files to LYRA files.
(Disk) #LC164 . . . . **$14.95**

VERSION UPDATE

To receive the latest version of LYRA return your original disk. #UP162 . . . . **$10.00**

LYRA MIDI CABLE

A cable to connect your computer to your MIDI synthesizer.
#MC158 . . . . **$19.95**

LYRA SYMPHONY 12 ENHANCER

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(Disk) #LS177 . . . . **$19.95**

LYRA LIBRARY

A collection of 50 songs ready to play for hours. Most have 7 and 8 voices. #LL137 . **$39.95**

SYMPHONY 12

A real hardware music synthesizer, lets LYRA play all 8 voices in stereo.
(T or D) #SY149 . . . . **$69.95**

COCO MID Seq/Editor

A professional quality MIDI interface for MIDI synthesizers.
(Disk only) #CM147 . . . . **$149.95**

MUSIC LIBRARY

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(T or D) #MLXXX **$29.95**

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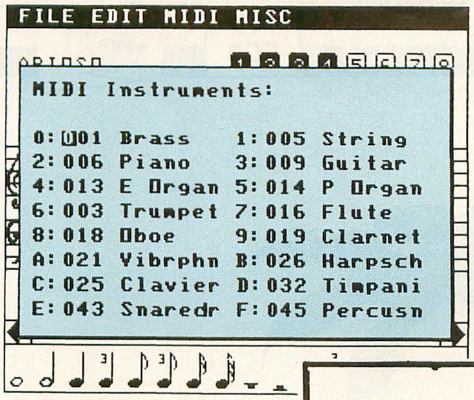

```
MIDI Instruments:

0:001 Brass     1:005 String
2:006 Piano     3:009 Guitar
4:013 E Organ   5:014 P Organ
6:003 Trumpet   7:016 Flute
8:018 Oboe      9:019 Clarnet
A:021 Vibrphn   B:026 Harpsch
C:025 Clavier   D:032 Timpani
E:043 Snaredr   F:045 Percusn
```

Introducing

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Coco 1, 2, 3 Compatible

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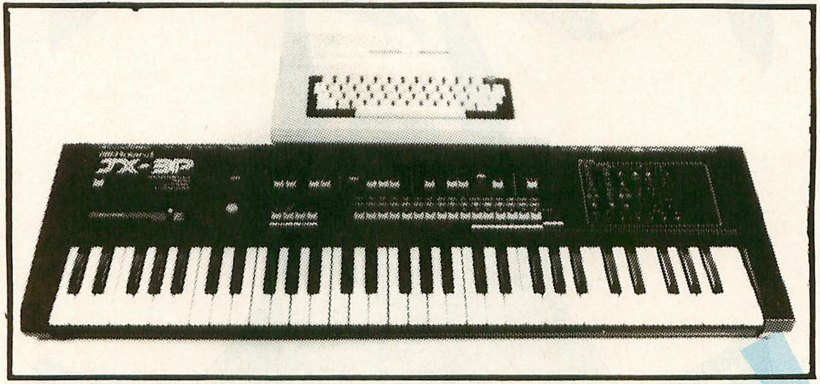

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Previous users return original disk with $20.

Now your COCO can talk to your MIDI music synthesizer. Whether you have a Korg, Roland, Casio, Yamaha, or Moog, it doesn't matter as long as it's MIDI equipped. Choose from our entry level MUSICA MIDI system that plays MUSICA files or our Professional COCO MIDI 2 system.

- Supports 16 Track recording and playback.
- Adjustable tempo.
- Over 45 Kbytes available (Over 15,500 MIDI events possible).
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- LYRA editing. (one voice per track).
- Playback from any number of tracks.
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- Dynamic memory allocation.
- Filter out MIDI data:
  - Key pressure
  - Program change
  - Pitch wheel
  - Control Change
  - Channel Pressure
  - System Message
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- Save recording to disk for later playback or editing.
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- 100% machine code.
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- Metronome
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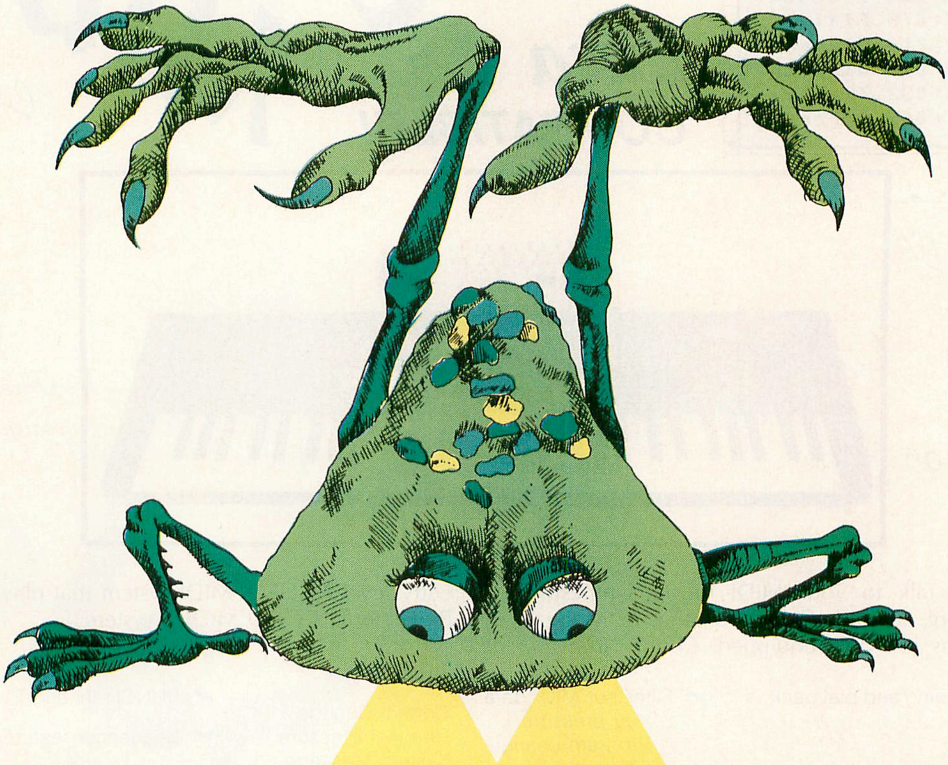
Put an end to alien-ation



Battle Back With Munchkin Blaster

By Steve Donald

Aliens are attacking, zooming around the sky, shooting laser bolts at your fuel tanks and crashing "kamikaze" into your laser cannons. You're in charge of defense at this military base, so it's up to you to eliminate the aliens by aiming the cross hairs of your heavy lasers and firing a bolt of energy at them.

To play *Munchkin Blaster*, push the firebutton to bring up the game screen. In the bottom corners are your two laser cannons, and in between them are your four white fuel tanks, which must be protected at all costs. When either or both of your lasers are destroyed, or all of your fuel tanks are blown up, the game is over and you are asked, "Another planet?"

After 20 aliens are eliminated, bonus points are awarded for lasers and fuel tanks remaining. Then, a new set starts, with all damages repaired and more vicious aliens to defeat.

I added the rapid fire feature to save your firing finger, and you have the options of using the speed-up poke and a high score. To make your high score permanent, change Line 30 so that `HS=` *your high score* and `H$=` *your name*, then resave the game. Good Luck!

(Questions about this game may be sent to Steve Donald, Oba, Ontario, Canada P0M 2P0. Please enclose an SASE for a response.) ☐

230	159	1050	243
430	208	1240	185
620	203	1300	2
760	240	1380	243
930	90	END	160

The listing: BLASTER

```
10 ' ###########################
20 ' ###########################
30 ' ##                       ##
40 ' ##   MUNCHKIN BLASTER    ##
50 ' ##                       ##
60 ' ##         BY            ##
70 ' ##                       ##
80 ' ##    STEPHEN DONALD     ##
90 ' ##                       ##
100 '##  OBA,ONTARIO,CANADA   ##
110 '##        P0M2P0         ##
120 '##                       ##
130 '###########################
140 '###########################
150 X=Y=M=N:CLS:PRINT"SPEED UP P
OKE [Y/N]?"
160 P$=INKEY$:IFP$="N"THENPO=1:G
OTO170ELSE IFP$<>"Y"THEN160
162 PRINT"DOUBLE OR TRIPLE [2/3]
"
164 P$=INKEY$:IFP$=""THEN164ELSE
 IFP$="3"THENPOKE65497,0:PO=3 EL
SE IFP$="2"THENPOKE65495,0:PO=2
ELSE164
170 DIMS(34),C(31),B(25),G(9):O=
1:HS=440:H$="STEVE"
180 IFTA=8THENRESTORE:TA=0
190 READEA$:HH=0:F=0:T=0:H=0:P=0
200 PLAY"T255L255":PMODE3,1:PCLS
:BS=1
210 DRAW"C4BM100,100E5R5F5G5L5H5
220 PAINT(105,100),4,4
230 DRAW"R5C2D2BR5U2BM150,100E6F
6D4ND4L12ND4U4
240 PAINT(155,100),2,2
250 DRAW"R3C3D2BR6U2BM150,150E6N
H4NE4F6ND4G6H6ND4
260 PAINT(155,150),3,3
270 DRAW"R5BU8C2D2BR4U2
280 GET(90,90)-(124,110),S,G
290 GET(143,89)-(169,112),C,G
300 GET(146,134)-(166,156),B,G
310 IFHH>0THEN320ELSEGOSUB1280
320 PCLS
330 COLOR3,1
```

Model 101 Interface $39.95

- Serial to parallel interface
- Works with any COCO
- Compatible with "Centronics" parallel input printers
- 6 switch selectable baud rates 300-600-1200-2400-4800-9600
- Small size 4" x 2" x 1"
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Model 104 Deluxe Interface $51.95

Same features as 101 plus
- Built in serial port for your modem or other serial device
- Switch between parallel output and serial output
- Size is 4.5" x 2.5" x 1.25"
- Comes complete with cables to connect to your computer and printer

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- U.L. listed foil-shielded cable
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- 3 ft./$3.95, 6 ft./$4.49, 10 ft./$5.59 Specify M/M or M/F and length.

Model 102 Switcher $35.95

- Connect to your COCO serial port and have 3 switch selectable serial ports
- Color coded indicator lights show switch position
- Lights also serve as a *power on* indicator for your COCO
- Heavy guage blue anodized aluminum cabinet with non-slip rubber feet

The 101 and 104 require power to operate. Most printers can supply power to your interface. (Star, Radio Shack and Okidata are just a few that do - Epson and Seikosha do not). The interfaces can also be powered by an AC adaptor; Radio Shack model 273-1431 plugs into all models. If you require a power supply, add a "P" to the model number and add $5.00 to the price. (Model 101P $44.95, Model 104P $56.95).

Model 105 Switcher $14.95

- Connects to your COCO to give you 2 switch selectable serial ports
- 3 foot cable to connect to your COCO's serial port
- The perfect item to use to connect a printer and a modem to your COCO
- Small in size, only 4.5 x 2.5 x 1.25

The Model 101, 102, 104 and 105 work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty.**

The Model 101 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Ioth, Seikosha, Panasonic and many others. They support BASIC print commands, word processors and graphic commands.

We manufacture these products - dealer inquiries are invited.

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45242

```
340 DRAW"C4BM0,160R20F10R195E10R
20D31L255U31C4BM50,172F4D6F4D4L4
H4G4L4U4E4U6E4
350 PAINT(50,180),4,4
360 CIRCLE(80,180),8,2,.5
370 COLOR3,1
380 LINE(30,171)-(225,171),PSET
390 CIRCLE(120,180),8,2,.5
400 CIRCLE(160,180),8,2,.5
410 CIRCLE(200,180),8,2,.5
420 FORI=80TO200STEP40:PAINT(I,1
80),2,2:NEXT
430 DRAW"C3BM38,191U14NR6U4BL4D4
NR4D14E4H4E4H4BM75,191U4E4R4F4D4
U4L12BM115,191U4E4R4F4ND4L12BM19
5,191U4E4R4F4ND4L12BM155,191U4E4
R4F4ND4L12
440 LINE(100,100)-(108,100),PSET
450 LINE(104,96)-(104,104),PSET
460 GET(95,91)-(115,109),G,G
470 X=95:Y=91:M=RND(235):N=RND(1
20)
480 COLOR4,1
490 LINE(95,91)-(115,109),PRESET
,BF
500 LINE(0,160)-(20,191),PSET,BF
510 LINE(235,160)-(255,191),PSET
,BF
520 FORQ=1TO200:NEXTQ:SCREEN1,0
530 O=RND(3):ON O GOTO 540,680,8
20
540 FORI=1TO 10-H
550 IFJOYSTK(0)<10THENX=X-5:IFX<
0THENX=0
560 IFJOYSTK(0)>53THENX=X+5:IFX>
235THENX=235
570 IFJOYSTK(1)<10THENY=Y-5:IFY<
0THENY=0
580 IFJOYSTK(1)>53THENY=Y+5:IFY>
141THENY=141
590 PUT(X,Y)-(X+20,Y+18),G,PSET
600 PUT(M,N)-(M+26,N+23),C,PSET
610 BU=PEEK(65280):IF BU=126 OR
BU=254 THENPLAY"O1EFEFDDFEFBBFC"
:ON BS GOSUB 960,970,980 ELSEGOT
O630
620 PUT(M,N)-(M+26,N+23),C,PSET:
IFPPOINT(X+10,Y+9)<>1THENFORI=1T
O10:PLAY"V10O1GF":PUT(M,N)-(M+I+
26,N+I+23),C,PSET:NEXTI:GOTO1020
630 M=VM+M:N=N+VN
640 IFM<0THENM=0ELSEIFM>229THENM
=229
650 IFN<0THENN=0ELSEIFN>120THENN
=120
660 NEXT
670 GOTO990
```

```
680 FORI=1TO 15-H
690 IFJOYSTK(0)<10THENX=X-5:IFX<
0THENX=0
700 IFJOYSTK(0)>53THENX=X+5:IFX>
235THENX=235
710 IFJOYSTK(1)<10THENY=Y-5:IFY<
0THENY=0
720 IFJOYSTK(1)>53THENY=Y+5:IFY>
141THENY=141
730 PUT(X,Y)-(X+20,Y+18),G,PSET
740 PUT(M,N)-(M+34,N+20),S,PSET
750 BU=PEEK(65280):IF BU=126 OR
BU=254THENPLAY"O1EFEFDDFEFBBFC":
ON BS GOSUB960,970,980ELSEGOTO77
0
760 PUT(M,N)-(M+34,N+20),S,PSET:
IFPPOINT(X+10,Y+9)<>1THENFORI=1T
O10:PLAY"O1FG":PUT(M,N)-(M+I+34,
N+I+20),S,PSET:NEXTI:GOTO1020
770 M=VM+M:N=N+VN
780 IFM<0THENM=0ELSEIFM>221THENM
=221
790 IFN<0THENN=0ELSEIFN>120THENN
=120
800 NEXT
810 GOTO990
820 VM=RND(2):IFVM=2THENVM=-1
830 IFJOYSTK(0)<10THENX=X-5:IFX<
0THENX=0
840 IFJOYSTK(0)>53THENX=X+5:IFX>
235THENX=235
850 IFJOYSTK(1)<10THENY=Y-5:IFY<
0THENY=0
860 IFJOYSTK(1)>53THENY=Y+5:IFY>
141THENY=141
870 PUT(X,Y)-(X+20,Y+18),G,PSET
880 PUT(M,N)-(M+20,N+22),B,PSET
890 BU=PEEK(65280):IF BU=126 OR
BU=254THENPLAY"O1EFEFDDFEFBBFC":
ON BS GOSUB960,970,980ELSEGOTO91
0
900 PUT(M,N)-(M+20,N+22),B,PSET:
IFPPOINT(X+10,Y+9)<>1THENFORI=1T
O10:PLAY"O1FG":PUT(M,N)-(M+I+20,
N+I+22),B,PSET:NEXTI:GOTO1020
910 M=M+VM*4:IFM<0THENM=0:GOTO94
0
920 IFM>235THENM=235:GOTO940
930 GOTO830
940 N=N+H+1:IFN>169THENPLAY"O1FG
FGFGBBDAGFEBDGFFFAAFDGEGEDBFBFBD
GCCCDGEFDBCGDEFAAGDBE":GOTO1140
950 GOTO830
960 LINE(10,160)-(X+10,Y+9),PSET
:LINE-(245,160),PSET:LINE(10,160
)-(X+10,Y+9),PRESET:LINE-(245,16
0),PRESET:RETURN
```

```
970 LINE(10,160)-(X+10,Y+9),PSET
:LINE(10,160)-(X+10,Y+9),PRESET:
RETURN
980 LINE(245,160)-(X+10,Y+9),PSE
T:LINE(245,160)-(X+10,Y+9),PRESE
T:RETURN
990 VM=(RND(10)-5):VN=RND(10)-5
1000 IFRND(5)=1THEN1070
1010 ON O GOTO 540,680,820
1020 P=P+10:LINE(M,N)-(M+44,N+22
),PRESET,BF:PLAY"O4;AGDFBAGDFEGC
BDGEGAF
1030 M=RND(221):N=RND(120)
1040 O=RND(3)
1050 T=T+1:IFT=10THENT=0:GOSUB14
30:HH=HH+1:SCREEN0,0:CLS6:PRINT@
200,"CONGRADULATIONS";:PRINT@228
,"YOU'VE CLEARED"HH"SET";:IFHH>1
THENPRINT"S";:GOTO1460ELSEGOTO14
60
1060 ON O GOTO 540,680,820
1070 F=40+RND(4)*40:LINE(M+12,N+
12)-(F,190),PSET:PLAY"O5EDEEDEBC
CE":LINE(M+12,N+12)-(F,190),PRES
ET:FORCC=1TO10:CIRCLE(F,180),CC,
4:PLAY"O1DEDE":NEXTCC:PLAY"O1EED
DEEBBCCB":LINE(F-10,170)-(F+10,1
91),PRESET,BF
1080 IFPPOINT(200,180)<>1THEN113
0
1090 IFPPOINT(80,180)<>1THEN1130
1100 IFPPOINT(120,180)<>1THEN113
0
1110 IFPPOINT(160,180)<>1THEN113
0
1120 GOTO1190
1130 ON O GOTO540,680,820
1140 IF BS=3ANDM>200THEN1190
1150 IF BS=2ANDM=0THEN1190
1160 IFM=0THEN BS=3
1170 IFM>200THEN BS=2
1180 M=RND(221):N=RND(120):O=RND
(3):GOTO1130
1190 GET(40,172)-(60,190),S,G
1200 FORY=160TO0STEP-5
1210 PUT(40,Y)-(60,Y+18),S,PSET
1220 LINE(40,Y+18)-(60,Y+24),PRE
SET,BF
1230 NEXT
1240 CLS4:IF P>HS THEN HS=P:PRIN
T@224,"YOU HAVE HIGH SCORE!";:PR
INT"WRITE YOUR NAME AND PRESS E
```

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```
NTER.";:INPUT H$ ELSEGOTO1260
1250 CLS3:PRINT"HIGH SCORE":PRIN
T;H$;"=";HS;:FORI=1TO3:PLAY"T20L
4CCGGAAL2GL4FFEEDDL2CL4GGFFEEL2D
L4GGFFEEL2DL4CCGGAAL2GL4FFEEDDL2
C":NEXTI
1260 CLS8:PRINT@224,EA$;" WAS DE
STROYED BUT YOU ESCAPED IN YOUR
ROCKET ALIVE.DO YOU WANT TO TRY
YOUR LUCK AT    ANOTHER PLANET?"
1270 A$=INKEY$:IFA$="Y"THENTA=TA
+1:GOTO180ELSEIFA$="N"THEN ON PO
 GOTO2000,2010,2020:ELSE1270
1280 PCLS:SCREEN1,1:DRAW"C8BM0,6
0R15F5D10G5NL15F5D10G5L15U40BR35
D40R20BR15U20NR20U10E10F10D30BR1
5BU5F5R10E5U10H5L10H5U10E5R10F5B
U5BR15R10NR10D40BR25NR20U20NR10U
20R20BR15ND40R15F5D10G5NL15F5D15
1290 DRAW"C7BM20,20ND20F10E10D20
BR5BU20D15F5R10E5U15BR5ND20F20U2
0BR20NF5L10G5D10F5R10NE5BR10U10N
U10R20NU10D10BR5U10R10NF10NE10L1
0U10BR30D20BR10U20F20U20
1300 DRAW"BM20,182C6ND8R2F2G2NL2
F2G2L2BE8F2NE2D6BR16R4U4L4U4R4BR
4R4L2D8BR6NR4U4NR4U4R4BR4D6F2E2U
6BR4NR4D4NR4D4R4BR14NU8R2E2U4H2L
2BR8D8R4U8L4BR8ND8F8U8BR4ND8R4D4
NL4D4BR4NR4U8BR8D8R2E2U4H2L2
1310 FORI=221TO10STEP-5:PUT(I,11
0)-(I+34,130),S,PSET:NEXT:FORI=0
TO100STEP5:PUT(I,146)-(I+26,179)
,C,PSET:NEXT:FORI=235TO200STEP-2
:PUT(I,110)-(I+20,132),B,PSET:NE
XT:FORI=1TO500*PO:NEXT
1320 SCREEN1,0
1330 DRAW"C2BM100,120R4F2D2G2NL4
F2D2G2L4U12BR13G3D3ND6R6ND6U3H3B
R11NF2L2G2D2F2R2F2D2G2L2NH2BR8NR
6U6NR4U6R6BR6D6NE6NF6D6BR10U12BR
4D12R6BR4NU12R6BR4NR6U6NR4U6R6BR
4ND12R4F2D2G2NL4F2D4
1340 DRAW"BM134,164U12F3E3ND12BR
4D10F2R2E2U10BR4ND12F12U12BR6NR4
G2D8F2R4BR4U12D6R6U6D12BR4U12D6N
E6F6BR4U12BR4ND12F12U12
1350 DRAW"BM0,140D12R4E2U2H2NL4E
2U2H2L4BR10D12R6BR6H2U8E2R2F2D8G
2L2BR8U12R4F2D2G2NL4F2D2G2L4
1360 FORI=1TO2500*PO:NEXT:CLS7
1370 PRINT@10,"INSTRUCTIONS";
1380 PRINT@96,"THE OBJECT IS TO
MOVE YOUR CROSS OVER THE BADGUYS
 AND USING THE  FIRE BUTTON HIT
THEM WITH YOUR LASERS.BEWARE OF
THE BASEKILLER. HE WILL TRAVEL T
OWARDS ONE OF   YOUR BASES AND D
ESTROY IT.THE  GAME IS OVER WHEN
 BOTH BASES";
1390 PRINT" AREDESTROYED OR ALL
YOUR WHITE FUELTANKS ARE GONE."
1400 PRINT@418,"PRESS BUTTON  TO
 START";
1410 PRINT@450,"HIGH SCORE=";HS;
"BY ";H$;
1420 FORK=1TO1000:BU=PEEK(65280)
:IF BU=126 OR BU=254THEN SOUND10
,5:RETURNELSENEXTK:GOTO1280
1430 FORX=80TO200STEP40:IFPPOINT
(X,180)<>1THENP=P+100
1440 NEXT:IFBS=1THENP=P+1000
1450 RETURN
1460 PRINT@290,"POINTS=";P;:FORI
=1TO500*PO:NEXTI
1470 H=HH:IFH>10THENH=10
1480 GOTO200
1490 DATA "THE EARTH","     MARS
","  JUPITER","  SATURN","  UR
ANUS","   VENUS","    PLUTO","
 MERCURY"," NEPTUNE"
2000 END
2010 POKE65494,0:END
2020 POKE65496,0
```

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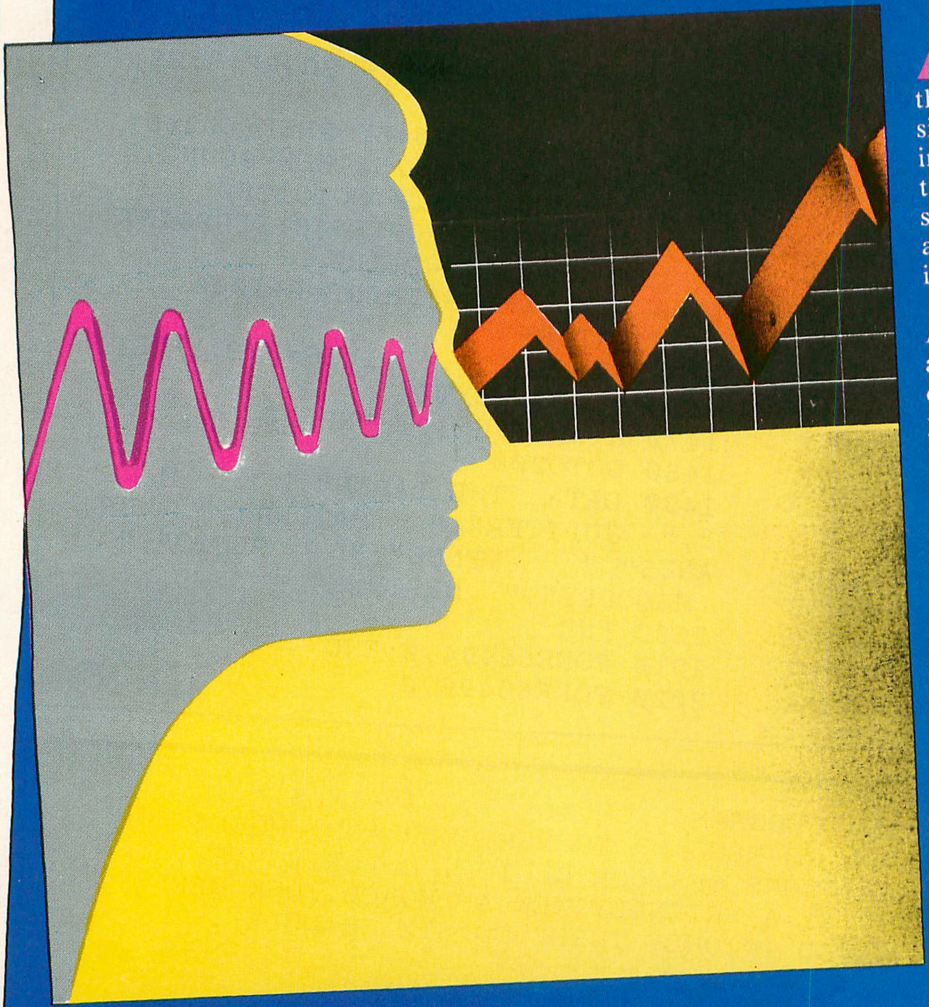
Learn CoCo Learn

By William D. English



Bill English teaches computer literacy, calculus and advanced mathematics at Greenfield-Central High School in Greenfield, Indiana. He also teaches night courses in programming at a local college.

Artificial intelligence is an area still in its infancy. If a computer can ever be designed that can think logically and creatively, the possibilities are both exciting and frightening. What would geniuses accomplish if their human needs did not have to be satisfied; if they had unlimited access to all knowledge? Incredible thought, isn't it?

I have written a short program, *CoCo Learn*, that allows CoCo to learn to play a game better. The first time I saw a discussion of this game was about 10 years ago in a math book. The idea is to reward the machine's moves every time it wins and to penalize the moves when it loses. This is accomplished by labeling boxes with each possible move. Thus, every game has to be designed beforehand.

I felt it would be better if the computer's memory expanded as the different games were played. The storage of the games had to be intertwined so that the same moves in the same situation would only be stored once.

Think how you learn to play a game. At first, your moves are only random. But, after a while, you begin to find certain methods that allow you to win and others that cause you to lose. This is what I wanted *CoCo Learn* to be able to do. Each time a game is won, all moves in the game are rewarded with a higher probability. If the game loses, all moves are given a lower probability. With a good player, the computer will learn quickly. Against a poor player, it will take much longer to learn winning ways.

CoCo Learn is played on a 3-by-3 quare like Tic-Tac-Toe. You begin with hree yellow markers at the bottom of he screen, and CoCo has three blue markers at the top. Each location is numbered 1 through 9. You win a game by either having one of your men reach the opposite end of the board or by blocking your opponent from any possible move.

Movement is similar to pawns in chess. You may move straight ahead only if that square is open, or you may move diagonally if an opponent's marker occupies that square. The object is to teach the computer to play better and better, eventually winning every game. CoCo will learn from each game played.

The board displays which opponent you're facing — another person or the computer — and whether the computer is playing at random or from memory, each move, and the number of wins for each player. To begin the game, you must answer two questions about the type and speed of the game. The board will then be displayed and you are ready to begin. You move first in every game.

The manner in which the program stores the moves may be of interest to you. For the opponent's moves, two bytes are required. The first contains the actual move, and the second contains the number of locations in memory to the next possible move at this point. For CoCo's moves, there are three bytes, the additional byte containing the probability of that particular move. This memory is stored at 30000 (15000 for 16K). You might like to look at this area after a few games. To do so, just type `FOR X=L TO E:?X, PEEK(X) :NEXT X` and press ENTER. Use the SHIFT and @ keys to scroll. CoCo's moves have 100 added to them; thus, they are easy to spot.

Here is a short example. Remember, the opponent (you) always moves first. Suppose the first game's moves are 7-4, 3-6 and 4-2. Memory beginning at `L` would be `L,74`, `L+1,0`, `L+2,136`, `L+3,0`, `L+4,0`, `L+5,41` and `L+6,0`. Then, a second game is completed with moves 7-4, 2-4, 9-6 and 4-8 with the computer winning this game. The memory would be the same from `L` to `L+6`, except for `L+3`, which would contain a `5` to point to CoCo's other possible first move. `L+7` through `L+14` now contains the new moves. As each game is played, the memory is expanded either at the bottom or somewhere in the middle, depending on how many moves are common to a previous game.

Now a third game is played with the first two moves the same as in the first game. The moves from the second game are moved down in memory, and the third game is added after the 4-2 move of the first game. The following table shows the situation after the third game.

I hope you enjoy this exercise and will correspond with me about your experiences with artificial intelligence.

If you have a 16K computer, change the `30000` in lines 20 and 30 to `15000`, and enter `PCLEAR 1` before running.

(Questions about this program may be addressed to the author at RR1, Box 407, Greenfield, IN 46140, 317-462-6034. Please enclose an SASE for a reply when writing.) □

L,74	Same first move each game by opponent
L+1,0	The 0 since no other first move yet
L+2,136	CoCo's first move
L+3,12	Or add 12 and look at L+14 for another possible move
L+4,0	Probability of move 3-6
L+5,42	Opponent's second move
L+6,2	Or add 2 to find another move stored
L+7,86	Of moving to 8-6
L+8,0	No other moves stored for this game
L+9,124	CoCo's response if opponent moves 8-6
L+10,0	No other possibilities
L+11,0	Probability
L+12,63	Opponent's response
L+13,0	
L+14,124	CoCo's other possible first move
L+15,0	No others
L+16,4	Probability
L+17,96	Opponent
L+18,0	
L+19,147	CoCo
L+20,0	
L+21,4	Probability

Table 1: Situation after third game.

210	142	1770	151
450	125	1850	73
750	140	2000	190
880	87	2270	221
1130	43	2460	116
1330	118	2580	136
1600	80	END	244

The listing: COCOLERN

```
0 '***********************
1 'LEARN COCO LEARN
2 'BY BILL ENGLISH
3 '   R. R. 1 BOX 407
4 '   GREENFIELD, IN 46140
5 '***********************
20 CLEAR 1000,30000
25 R=RND(-TIMER)
30 E=30000:L=E:FOR X=L TO L+100:
POKE X,0:NEXT X:MU$="O3L100A":MO
$="L32G"
40 GOSUB 2560:'INITIAL QUESTIONS
50 GOSUB 2440:'DRAW GAME BOARD
60 GOTO 740
70 '*********
80 'STORE MOVES
90 NM=MN:IF WF=-1 THEN PB=4 ELSE
 PB=-4
100 CC=0:ML=L:KM(0)=0:FL=0
110 IF CC=NM THEN RETURN
120 P=PEEK(ML)
130 IF P<>M(CC) THEN 200
140 KM(CC)=ML
150 IF CC/2=INT(CC/2) THEN NE=2
:GOTO 180
160 NE=3
170 MZ=ML:GOSUB 640:'STORE PROB
180 ML=ML+NE:CC=CC+1
190 GOTO 110
200 PZ=PEEK(ML+1)
210 IF PZ=0 THEN KI=ML:KM(CC)=ML
:GOTO 240
220 ML=ML+PZ
230 GOTO 120
240 KK=CC
250 P=PEEK(KM(KK)+1)
260 IF P<>0 THEN 300
270 KK=KK-1
280 IF KK<0 THEN KM=E:FL=E:GOSUB
 530:RETURN
290 GOTO 250
300 FL=P+KM(KK)
310 EL=0
320 FOR X=CC TO NM-1
330 IF X/2=INT(X/2) THEN NE=2 EL
SE NE=3
340 EL=EL+NE
350 NEXT X
360 FOR X=E-1 TO FL STEP -1
370 PK=PEEK(X)
380 POKE X+EL,PK
390 NEXT X
400 KM=FL
410 FOR X=FL-1+EL  TO FL STEP -1
: POKE X,0:NEXT X
420 '********
430 GOSUB 530
440 BG=L
450 IF BG>=KI THEN 520
460 PZ=PEEK(BG+1)
470 IF PZ+BG<FL THEN 490
480 POKE BG+1,PZ+EL
490 IF PEEK(BG)>100 THEN NE=3 EL
SE NE=2:'FOUND COMPUTER MOVE
500 BG=BG+NE
510 GOTO 450
520 RETURN
530 FOR X=CC TO NM-1
540 POKE KM,M(X)
550 POKE KM+1,0
560 IF X/2=INT(X/2) THEN NE=2:GO
TO 590
570 NE=3
580 MZ=KM:GOSUB 640:'STORE PROB
590 KM=KM+NE
600 E=E+NE
610 NEXT X
620 POKE KI+1,FL-KI
630 RETURN
640 'STORE PROBABILITY
650 PM=PEEK(MZ+2)
660 IF PM=1 AND PB=-4 THEN 710
670 IF PM=0 THEN PM=5
680 PM=PM+PB
690 IF PM<0 THEN PM=1
700 IF PM>99 THEN PM=99
710 POKE MZ+2,PM
720 RETURN
730 '**************
740 'INITIALIZATION FOR EACH GAM
E
750 PRINT@386,USING"###";TC;:PRI
NT@410,USING"###";TH;
760 PRINT@483,USING"###";ZC;:PRI
NT@507,USING"###";ZH;
770 FOR KD=7 TO 9:GOSUB 1980:CL=
159:GOSUB 2020:NEXT KD
780 FOR KD=4 TO 6:GOSUB 1980:CL=
143:GOSUB 2020:NEXT KD
790 FOR KD=1 TO 3:GOSUB 1980:CL=
175:GOSUB 2020:NEXT KD
800 FOR P=1 TO 9:P(P)=INT((P+2)/
3)-2:NEXT P
810 WF=0:MN=0:'WIN FLAG AND MOVE
 NUMBER
815 SCREEN 0,1:FOR JZ=1 TO 10:PL
AY"L255GEC":NEXT JZ:SCREEN 0,0
820 'GET HUMAN MOVE
830 H1=254:H2=286
840 IF HR=1 THEN PRINT@153,"RAND
OM";
850 IF HR=0 THEN PRINT@153,"HUMA
N";
855 PRINT@185,CHR$(159)"YOUR"CHR
$(159);
860 PRINT@217,CHR$(159)"MOVE"CHR
$(159);
870 PRINT@H1,"";
880 PRINT@H2,"";
890 PRINT@H1,CHR$(191);:PRINT@H2
,CHR$(191);
900 IF HR=0 THEN 910 ELSE PA=RND
(6)+3:A$=STR$(PA):GOTO 920
910 A$=INKEY$:IF A$="" THEN 910
920 HF=VAL(A$)
930 IF HR=0 THEN PLAY MU$
940 PRINT@H1,RIGHT$(A$,1);
950 IF P(HF)<>1 THEN 870
960 PRINT@H2,"";
970 IF HR=0 THEN 980 ELSE PA=RND
(6):A$=STR$(PA):GOTO 990
980 A$=INKEY$:IF A$="" THEN 980
990 HT=VAL(A$)
1000 IF HR=0 THEN PLAY MU$
1010 PRINTRIGHT$(A$,1);
1020 IF HF=7 AND HT=3 THEN 870
1030 IF HF=6 AND HT=4 THEN 870
1040 IF HF-HT=3 AND P(HT)=0 THEN
 1070
1050 IF (HF-HT=4 OR HF-HT=2) AND
 P(HT)=-1 THEN 1070
1060 GOTO 870
1070 GOSUB 1410:REM MAKE MOVE
1080 PRINT@217,"       ";:PRINT@1
85,"     ";
1090 P(HF)=0:P(HT)=1:'UPDATE GAM
E BOARD
1100 M(MN)=10*HF+HT:'STORE MOVE
AWAY
1110 MN=MN+1
1120 IF MN>1 THEN GOSUB 1600:'CH
ECK FOR WINNER
1130 IF WF<>0 THEN 740:'IF WINNE
R START OVER
1140 'COMPUTER MOVES AT RANDOM
1150 GOSUB 2080:'SEE IF GAME IN
MEMORY
1160 C1=230:C2=262
1170 PRINT@194,"MOVE";
1180 IF RF=1 THENCF=RND(6):PRINT
@129,"RANDOM";
1190 IF RF<>1 THEN PRINT@129,"ME
MORY";:PLAY"L255EC"
1200 IF P(CF)<>-1 THEN 1180
1210 CF$=STR$(CF)
1220 PRINT@C1,RIGHT$(CF$,1);
1230 IF RF=1 THEN CT=RND(6)+3
1240 IF CT=7 AND CF=3 THEN 1230
1250 IF CT=6 AND CF=4 THEN 1180
1260 IF CT-CF=3 AND P(CT)=0 THEN
 1300
1270 IF (CT-CF=4 OR CT-CF=2) AND
 P(CT)=1 THEN 1300
1280 GOTO 1180
1290 PLAY MU$
1300 CT$=STR$(CT)
1310 PRINT@C2,RIGHT$(CT$,1);
1320 PLAY MU$
1330 GOSUB1520:'MAKE MOVE
1340 PRINT@194,"    ";
```

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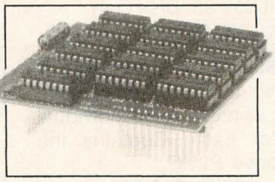

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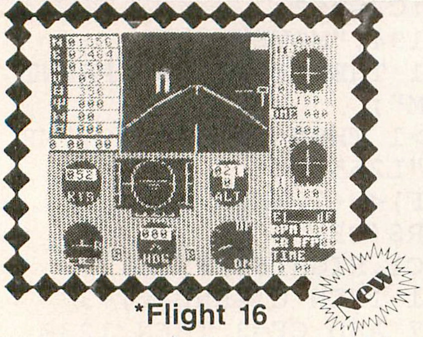

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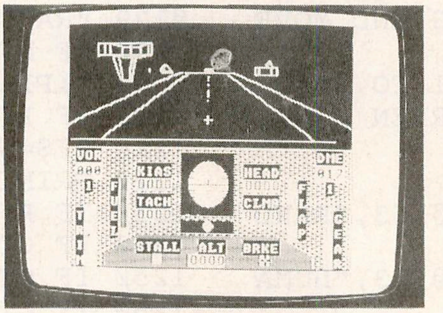

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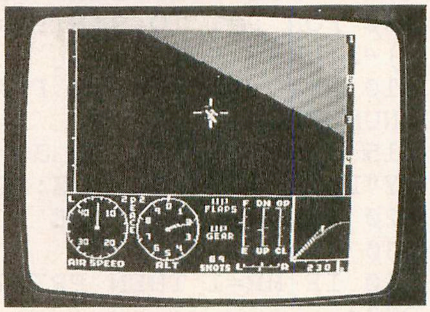

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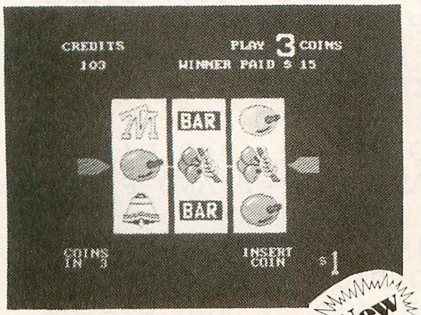

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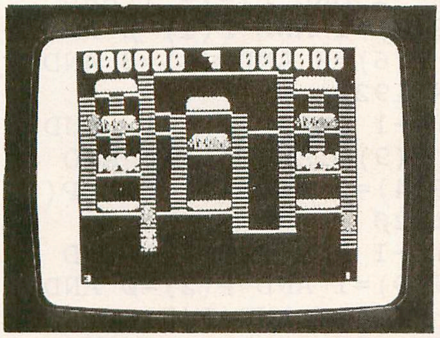

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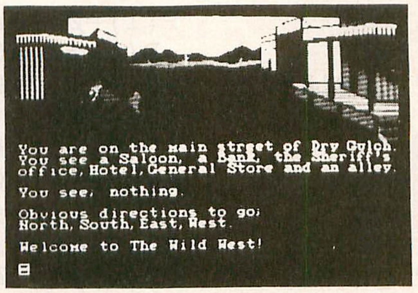

You are on the main street of Dry Gulch.
You see a Saloon, a Bank, the Sheriff's office, Hotel, General Store and an alley.

You see, nothing.

Obvious directions to go;
North, South, East, West.

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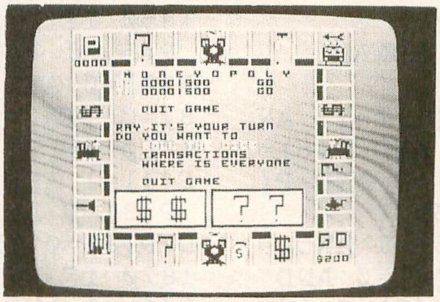

*Moneyopoly

Play the popular board game on one of the most realistic computer game simulations ever! Contains all the features of the original. Buy, sell, rent, wheel & deal your way to fortune.

32K Joystick Required $22.95

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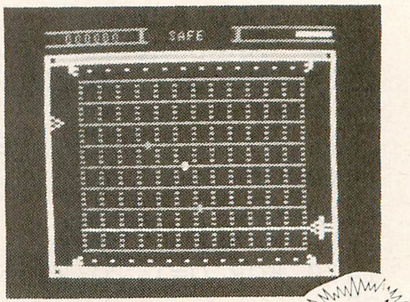
***FANG MAN**	— A high res graphics arcade-type game based on the Dracula legend. You are Dracula and must evade countless hazards in your search for new victims.	16K & Joysticks Required $22.95
***PAK PANIC**	— A fast paced game in which 'Pakman' is steered through a maze, pursued by four monsters, while trying to eat dots and power pills.	32K & Joysticks Required $22.95



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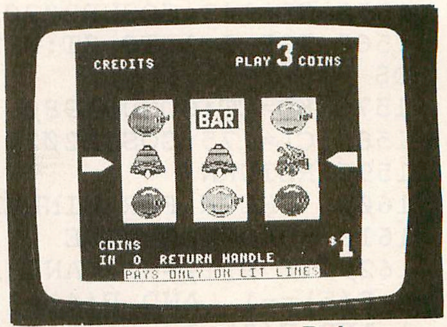
Specify Tape or Disk



*Vegas Game Pak

Six games in all! Blackjack, Keno, Video Poker & 3 slot machine lookalikes. Super graphics! Joysticks Required.

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*COCO 3 Compatible

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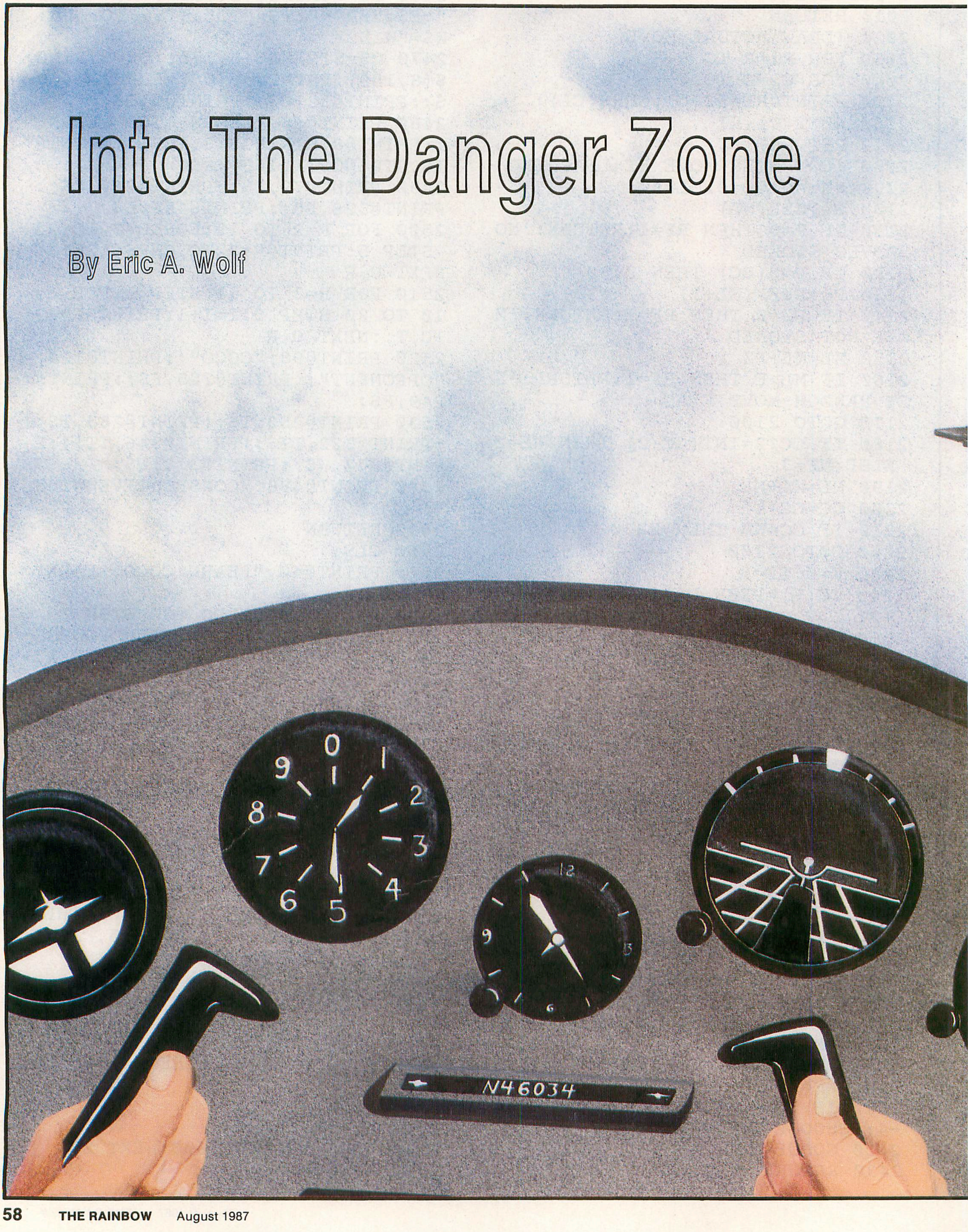
```
1350 P(CF)=0:P(CT)=-1
1360 M(MN)=10*CF+CT+100
1370 MN=MN+1
1380 IF MN>1 THEN GOSUB 1750:'CH
ECK FOR WINNER
1390 IF WF<>0 THEN 740
1400 GOTO 820
1410 'MAKE HUMAN MOVE
1420 FOR Q=1 TO ZT:NEXT Q:PLAY M
O$
1430 KD=HF:GOSUB 1980
1440 CL=143
1450 GOSUB 2020
1460 KD=HT
1470 FOR Q=1 TO ZT:NEXT Q:PLAY M
O$
1480 GOSUB1980
1490 CL=159
1500 GOSUB 2020
1510 RETURN
1520 'MAKE COMPUTER MOVE
1530 FOR Q=1 TO ZT:NEXT Q:PLAY M
O$
1540 KD=CF:GOSUB1980
1550 CL=143:GOSUB2020
1560 FOR Q=1 TO ZT:NEXT Q:PLAY M
O$
1570 KD=CT:GOSUB1980
1580 CL=175:GOSUB2020
1590 RETURN
1600 'CHECK FOR WINNER HUMAN
1610 'BLOCKED MOVE
1620 IF P(1)=-1  AND P(3)=-1  AN
D P(5)=-1  AND P(4)=1  AND P(6)=
1 AND P(8)=1  AND P(2)=0 AND P(
7)=0 AND P(9)=0 THEN 1690
1630 IF P(2)=-1 AND P(5)=1 AND P
(1)=0 AND P(3)=0 AND P(4)=0 AND
P(6)=0 AND P(7)=0 AND P(8)=0 AND
 P(9)=0  THEN 1690
1640 'CHECK FOR OUTRIGHT WIN
1650 FOR P=1 TO 3
1660 IF P(P)=1 THEN 1690
1670 NEXT P
1680 GOTO 1740
1690 FOR XZ=1 TO 20:PRINT@89,"WI
NNER";:PLAY"L100A":PRINT@89,"
   ";:NEXT XZ
1700 TH=TH+1
1710 ZH=ZH+1:ZC=0
1720 WF=1
1730 GOSUB 80:'STORE GAME AWAY
1740 RETURN
1750 'CHECK FOR COMPUTER WIN
1760 'BLOCK MOVE
1770 IF P(1)=-1 AND P(5)=-1 AND
P(4)=1 AND P(8)=1 AND P(2)=0 AND
 P(3)=0 AND P(6)=0 AND P(7)=0 AN
D P(9)=0 THEN 1920
1780 IF P(4)=-1 AND P(5)=-1 AND
P(1)=0 AND P(2)=0 AND P(3)=0 AND
 P(6)=0 AND P(7)=0 AND P(8)=0 AN
D P(9)=0 THEN 1920
1790 IF P(5)=-1 AND P(6)=-1 AND
P(1)=0 AND P(2)=0 AND P(3)=0 AND
 P(4)=0 AND P(7)=0 AND P(8) =0 A
ND P(9) =0 THEN 1920
1800 IF P(2)=-1  AND P(3)=-1 AND
 P(5)=1  AND P(6)=1  AND P(1)=0
AND P(4)=0 AND P(7)=0 AND P(8)=0
 AND P(9)=0  THEN 1920
1810 IF P(1)=-1 AND P(2)=-1  AND
 P(4)=1  AND P(5)=1 AND P(3)=0 A
ND P(6)=0 AND P(7)=0 AND P(8)=0
AND P(9)=0 THEN 1920
1820 IF P(1)=-1 AND P(6)=-1  AND
 P(4)=1 AND P(9)=1   AND P(2)=0
AND P(3)=0 AND P(5)=0 AND P(7)=0
 AND P(8)=0   THEN 1920
1830 IF P(3)=-1 AND P(4)=-1  AND
 P(7)=1 AND P(6)=1 ANDP(1)=0 AND
 P(2)=0 AND P(5)=0 AND P(8)=0 AN
D P(9)=0 THEN 1920
1840 IF P(2)=-1 AND P(4)=-1 AND
P(5)=1 AND P(7)=1 AND P(1)=0 AND
 P(3)=0 AND P(6)=0 ANDP(8)=0 AND
 P(9)=0 THEN 1920
1850 IF P(2)=-1 AND P(6)=-1  AND
 P(5)=1 AND P(9)=1ANDP(1)=0 AND
P(3)=0 AND P(4)=0 ANDP(7)=0ANDP(
8)=0  THEN 1920
1860 IF P(1)=-1 AND P(6)=-1 AND
P(4)=1 AND P(9)=1 AND P(2)=0 AND
 P(3)=0 AND P(5)=0 AND P(7)=0 AN
D P(8)=0 THEN 1920
1870 IF P(3)=-1 AND P(5)=-1 AND
P(6)=1 AND P(8)=1 AND P(1)=0 AND
 P(2)=0 AND P(4)=0 AND P(7)=0 AN
D P(9)=0 THEN 1920
1880 FOR P=7TO 9
1890 IF P(P)=-1 THEN 1920
1900 NEXT P
1910 GOTO 1970
1920 FOR XZ=1 TO 20:PRINT@65,"WI
NNER";:PLAY"L100;E":PRINT@65,"
   ";:NEXT XZ
1930 WF=-1
1940 ZC=ZC+1:ZH=0
1950 GOSUB 80:'STORE GAME AWAY
1960 TC=TC+1
1970 RETURN
1980 RO=INT((KD-1)/3):'COMPUTE R
OW(0 TO 2)
1990 IF KD/3=INT(KD/3) THEN CO=3
 ELSE IF (KD+1)/3=INT((KD+1)/3)
THEN CO=2 ELSE CO=1
```

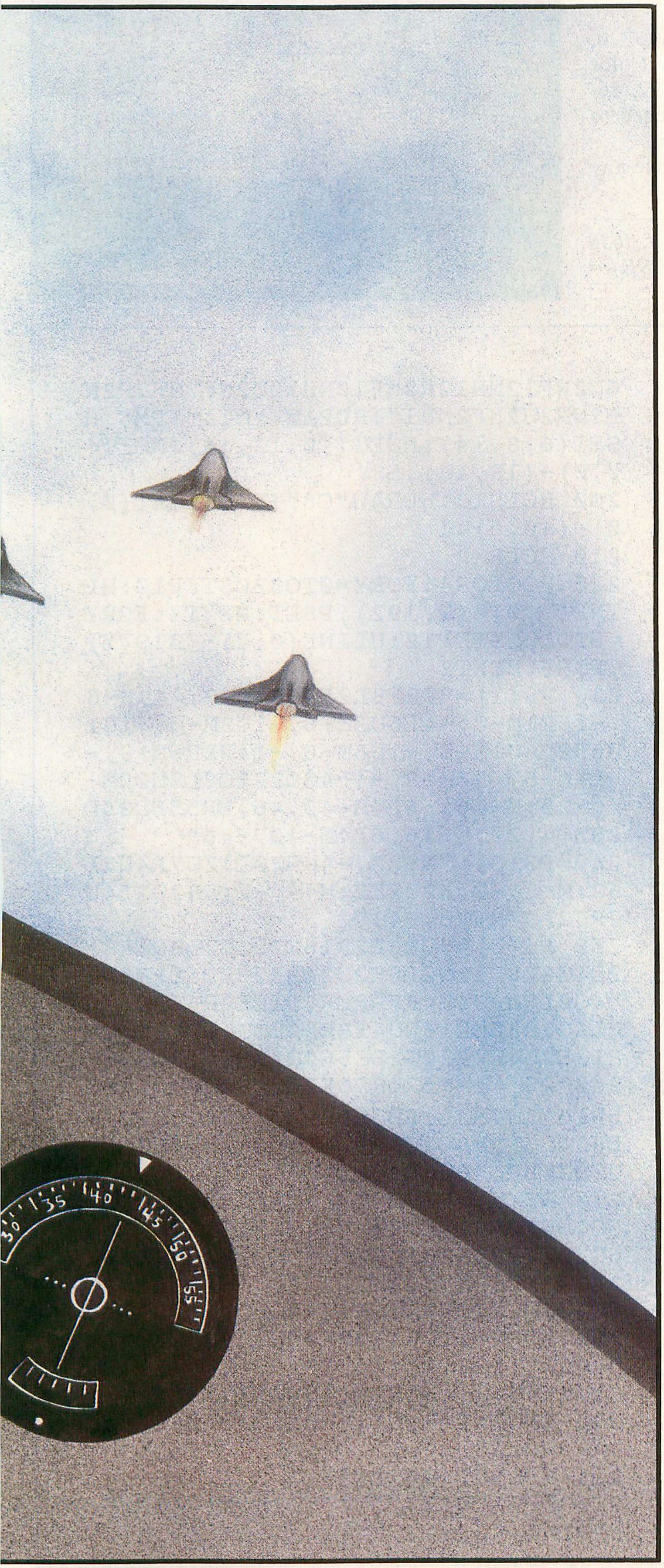
```
2000 R=4*RO+4:C=5*(CO-1)+9:'COMP
UTE PROPER ROW AND COLUMN TO DRA
W PIECE IN
2010 RETURN
2020 'DRAW ACTUAL MOVE
2030 FOR R1=R TO R+1
2040 FOR C1=C TO C+3
2050 PRINT@R1*32+C1,CHR$(CL);
2060 NEXT C1,R1
2070 RETURN
2080 'COMPUTER MOVE BY LEARNING
2090 NM=MN:CC=0:ML=L
2100 P=PEEK(ML)
2110 IF P=0 THEN RF=1:RETURN:'NO
 MOVES STORED
2120 IF P=M(CC) THEN 2180
2130 PZ=PEEK(ML+1)
2140 IF PZ=0 THEN RF=1:RETURN:'M
OVE NOT STORED
2150 ML=ML+PZ
2160 IF ML>E THEN RF=1:RETURN:'S
ET RANDOM MOVE FLAG
2170 GOTO 2100
2180 IF CC/2=INT(CC/2) THEN NE=2
 ELSE NE=3
2190 ML=ML+NE
2200 CC=CC+1
2210 IF CC=NM THEN 2230
2220 GOTO 2100
2230 K=0:TP=0
2240 SM(K)=PEEK(ML):SP(K)=PEEK(M
L+2)
2250 P=PEEK(ML+1)
2260 IF P=0 THEN 2300
2270 K=K+1
2280 ML=ML+P
2290 GOTO 2240
2300 FOR X=0 TO K:TP=TP+SP(K):NE
XT X:'ADD UP PROBS
2310 RP=RND(TP):IF TP<3 THEN RF=
1:RETURN:'IF NOT MUCH TO CHOOSE
FROM GO BACK TO PICK MOVE AT RAN
DOM
2320 TP=0
2330 FOR X=0 TO K
2340 TP=TP+SP(K)
2350 IF TP>RP THEN 2370
2360 NEXT X
2370 CM=SM(K)-100:CF=INT(CM/10):
CT=CM-10*CF
2380 RF=-1:RETURN:'SET RANDOM FL
AG TO MEMORY
2390 REM STORE GAME AWAY
2400 NM=MN
2410 IF WF=-1 THEN PB=4 ELSE PB=
-4:'CHOOSE PROBABILITY
2420 GOSUB 80
2430 RETURN
```

```
2440 'DRAW BOARD
2450 CLS
2460 B$=STRING$(16,128):M$="MOVE
":F$="FROM":T$="TO":TT$="TOTAL":
W$="WINS"
2470 C$=STRING$(8,175):O$=STRING
$(8,159):PRINT@56,O$;:PRINT@24,O
$;:PRINT@32,C$;:PRINT@0,C$;
2480 PRINT@40,"LEARN COCO LEARN"
;:PRINT@8,STRING$(8,169);:PRINT@
16,STRING$(8,153);
2490 PRINT@72,B$;:PRINT@200,B$;:
PRINT@328,B$;:PRINT@456,B$;
2500 FOR R=2 TO 13:FOR C=8 TO 23
 STEP 5:PRINT@R*32+C,CHR$(128);:
NEXT C,R
2510 FOR R=3 TO 11 STEP 4:FOR C=
10 TO 20 STEP 5:I=I+1:PRINT@R*32
+C,I;:NEXT C,R
2520 PRINT@98,"COCO";:PRINT@120,
"OPPONENT";:PRINT@225,F$;:PRINT@
249,F$;
2530 PRINT@259,T$;:PRINT@283,T$;
:PRINT@322,TT$;:PRINT@346,TT$;:P
RINT@354,W$;:PRINT@378,W$;
2540 PRINT@488,"CONSECUTIVE WINS
";
2550 RETURN
2560 CLS
2570 PRINT@40,"LEARN COCO LEARN"
;
2580 PRINT:PRINT"DO YOU WISH TO
PLAY AGAINST THE COMPUTER YOURSE
LF OR TO WATCH     THE GAME PLAY
ED AT RANDOM"
2590 PRINT"     TYPE H FOR HUMAN
 GAME          OR R FOR RANDOM
GAME"
2600 PRINT@235,"H OR R";
2610 Z$=INKEY$:IF Z$="" THEN 261
0
2620 IF Z$="H" THEN HR=0 ELSE IF
 Z$="R" THEN HR=1 ELSE 2600
2630 PRINT"  ";:IF Z$="H" THEN P
RINT"HUMAN" ELSE PRINT"RANDOM"
2640 PRINT:PRINT"    SELECT THE
SPEED OF PLAY    (1 THRU 5, 1 IS
 FAST 5 IS SLOW)"
2650 PRINT@363,"1 THRU 5";
2660 Z$=INKEY$:IF Z$="" THEN 266
0
2670 Z=VAL(Z$)
2680 IF Z>5 OR Z<1 THEN 2650 ELS
E Z=INT(Z)
2690 PRINT"  ";Z
2700 ZT=(Z-1)*80
2710 FOR ZZ=1 TO 1000:NEXT ZZ
2720 RETURN
```

Into The Danger Zone

By Eric A. Wolf





The scenario: You are flying your F-15 Eagle in pursuit of an enemy fleet of craft intruding on your airspace. Your orders are to shoot to kill.

F-15 Ground Assault Simulator is an action game written specifically for the new Color Computer 3 with 128K. An RGB monitor is recommended for correct color interpretation, but not needed.

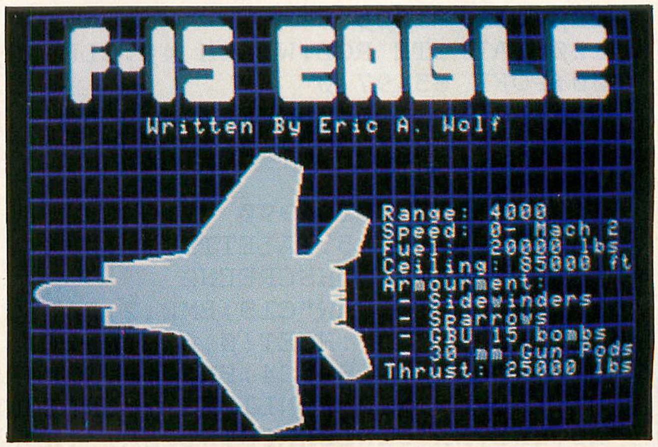
You must perform your mission using the right joystick and various keys on the keyboard to operate plane functions.

After running the program, you are greeted by the title screen and a short song. Next, you need to type the skill level at which you want to play. The easiest is Level 0; Level 9 is nearly impossible. Let's play Skill Level 3, just for starters.

The game screen appears and you see a fuel gauge, a horizon gauge, a thrust meter and radar (all of which work in real time). Control your ship like a real aircraft: to go up, pull the stick back and vice versa for down. If you are not using an RGB monitor, you will not be able to see your own aircraft. You will only see its shadow on the ground. Therefore, pulling back and pushing forward on the stick will have little *visible* effect.

The radar shows the enemy position in relation to the screen, and the horizon gauge shows the ground in relation to your craft. The fuel gauge shows how much fuel is left in your tanks; when you run out of fuel, you will crash. The thrust gauge controls the speed and maneuvers of your plane. Use the up and down arrows to control this factor. The more thrust you've got, the more quickly fuel is used.

Move your ship into position and press the joystick button to fire. Watch out: The enemy may shoot back. The frequency of the enemy's attacks depends on the skill level you picked at the start of the game.



```
F-15 EAGLE
Written By Eric A. Wolf
Range: 4000
Speed: 0- Mach 2
Fuel: 20000 lbs
Ceiling: 85000 ft
Armourment:
 - Sidewinders
 - Sparrows
 - GBU 15 bombs
 - 30 mm Gun Pods
Thrust: 25000 lbs
```

Now that you know how to play, let's take a look at how some of the game's effects are achieved. The moving scenery is drawn in two palette colors. One is a visible color and the other is the background color (invisible). These colors are switched from visible to invisible, using the palette command, at a speed that achieves

---

Eric Wolf is 14 years old and attends Dickinson Middle School. He is currently writing a line of computer software that deals with games and utilities.

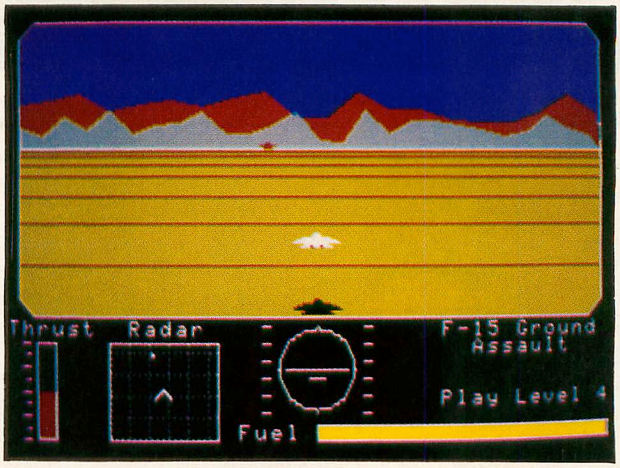
flicker-free animation. The variable for thrust controls how much time passes before the next switch of scenery lines.

The game's graphics, like the plane's in-flight positions, are drawn at the very beginning of the program right before the title screen is displayed.

F-15 Ground Assault Simulator uses the speed-up poke, `65497,0`, to make the program run even faster. It also uses the new Color Computer 3's advanced graphics system and the 320-by-192, 16-color screen. The palette colors for the screen may be changed to fit your personal preferences; they are contained in Line 185.

I hope this explanation will get you started, but if you have any questions, please feel free to write.

(Questions about this game may be addressed to Eric Wolf, 1630 N. Johnson St., South Bend, IN 46628. Please enclose an SASE for a reply.) □



190	20	730	219
260	255	850	62
360	19	970	60
460	109	1080	186
580	229	1190	192
640	239	END	118

The listing: `F15EAGLE`

```
10 REM ==========================
20 REM =       F-15 EAGLE       =
30 REM =    "GROUND ASSAULT"    =
40 REM =                        =
50 REM = WRITTEN BY: ERIC WOLF =
60 REM = 1630 N. JOHNSON STREET=
70 REM = SOUTH BEND, INDIANA   =
80 REM =                  46628=
90 REM ==========================
100 REM
110 CLEAR1000
120 PALETTE RGB:WIDTH 40:CLEAR20
00:POKE 65497,0
130 FORY=1TO5:HBUFF Y,275:NEXTY:
HBUFF 6,100:HBUFF 7,100:HBUFF 8,
100
140 ON BRK GOTO 990
150 FORY=0TO15:PALETTEY,0:NEXTY:
POKE &HFF9A,0:HSCREEN2
160 HCLS0:HDRAW"C15;BM2,2;R4L2U1
L4R8L4U1L1R2":HGET(0,0)-(8,2),6
170 HCLS13:PL$="S4;BM20,6;NL8NR8
U1NL6NR6U1NL2NR2NL12NR12U1NL10NR
10U1NL7NR7U1NL2NR2U1NL1NR1":HDRA
W "C11"+PL$:HCOLOR14:HSET(17,6):
HSET(18,6):HSET(22,6):HSET(23,6)
:HGET(0,0)-(40,6),3:HCLS13
180 PM$="S3;BM10,10;NG8NE8L2NG6N
E6U2NG12NE12L2NG10NE10U2NE7NG7L2
NG2NE2U2NG2NE1":HDRAW "C11"+PM$:
HSET(8,12,14):HSET(12,8,14):HGET
(0,0)-(18,18),4:HCLS 13
190 PM$="S3;BM8,10;NF8NH8R2NF6NH
6U2NF12NH12R2NF10NH10U2NF7NH7R2N
F2NH2U2NF2NH1":HDRAW "C11"+PM$:H
SET(6,8,14):HSET(10,12,14):HGET(
0,0)-(18,18),5
200 HCLS13:HDRAW"C8"+PL$:HGET(0,
0)-(40,6),1
210 HCLS
220 HCOLOR4:FORY=0TO320STEP10:HL
INE(Y,0)-(Y,192),PSET:NEXTY:FORY
=0TO192STEP12:HLINE(0,Y)-(319,Y)
,PSET:NEXTY
230 P$(1)="R8F8L2F12R4M+8,-4;M-6
,-16R1M-8,-4L6U2M+6,-1U8M-6,-1U1
R6U2L6U1M+6,-1U8M-6,-1;U2R6M+8,-
4L1M+6,-16M-8,-4L4G12R2G8L8U20M+
4,-20;M-16,-6L4M-40,46;BR55BD36D
20M+4,20;M-16,6L4M-40,-46"
240 P$(2)="M-28,-4NR20L12U7R4U2L
32;M-8,-2;H2U2E2;M+8,-2;R32U2L4U
7R32L20M+28,-4;"
250 P$(3)="U16E2R16F2D4G2L8D4R8F
2D4G2L8D12G2L6H2U24BR26BD6E2R8F2
D4G2L8H2U4D4F2R8BR8D12F2R6E2U30H
2L6G2D30BR16NU4F2R20E2U16H2L13U6
R13E2U4H2L20G2D15F2R13D6L13G2
260 P$(4)="BR48D5F2R24E2U4H2L16U
5R16E2U4H2L16U5R16E2U4H2L24G2D24
BR34D6F2R8E2U6R4D6F2R8E2U30H2L24
G2D24BR12BU8R4U8L4D8
270 P$(5)="BR22D14F2R28E2U16H2L1
6G2D4F2R8D4L10H2U14E2R16E2U4H2L2
6G2D24BR38D6F2R28E2U6H2L16H2U20H
2L8G2D28BR38D2F2R24E2U4H2L16U5R1
6E2U4H2L16U5R16E2U4H2L24G2D28
280 FORY=0TO0:FORX=0TO1:HDRAW"BM
"+STR$(138+X)+","+STR$(146+Y)+";
C3;"+P$(1):HDRAW P$(2):NEXTX,Y
290 HPRINT(8,6),"Written By Eric
 A. Wolf"
300 HPAINT(80,130),2,3
310 HPRINT(23,11),"Range: 4000":
HPRINT(23,12),"Speed: 0- Mach 2"
```

```
:HPRINT(23,13),"Fuel:  20000 lbs
"
320 HPRINT(23,14),"Ceiling: 8500
0 ft":HPRINT(23,15),"Armourment:
":HPRINT(24,16),"- Sidewinders"
330 HPRINT(24,17),"- Sparrows":H
PRINT(24,18),"- GBU 15 bombs":HP
RINT(24,19),"- 30 mm Gun Pods"
340 HPRINT(23,20),"Thrust: 25000
 lbs"
350 X1=20:Y1=20:HDRAW"C1;BM"+STR
$(X1)+","+STR$(Y1)+";"+P$(3):HDR
AW P$(4):HDRAW P$(5):HPAINT(X1+4
,Y1+4):HPAINT(X1+32,Y1-4):HPAINT
(X1+52,Y1+4):HPAINT(X1+64,Y1+9):
HPAINT(X1+112,Y1+9)
360 HPAINT(X1+150,Y1+9):HPAINT(X
1+180,Y1+9):HPAINT(X1+218,Y1+9):
HPAINT(X1+258,Y1+9)
370 X1=24:Y1=24:HDRAW"C3;BM"+STR
$(X1)+","+STR$(Y1)+";"+P$(3):HDR
AW P$(4):HDRAW P$(5):HPAINT(X1+4
,Y1+4):HPAINT(X1+32,Y1-4):HPAINT
(X1+52,Y1+4):HPAINT(X1+64,Y1+9):
HPAINT(X1+112,Y1+9)
380 HPAINT(X1+150,Y1+9):HPAINT(X
1+180,Y1+9):HPAINT(X1+218,Y1+9):
HPAINT(X1+258,Y1+9)
390 '*       DELETE LINE 420 IF YO
U    *
400 '* ARE USING A CMP MONITOR O
R TV *
410 '
420 GOTO 480
430 '
440 '**** CMP COLOR PALETTES ***
**
450 PALETTE0,0:PALETTE1,16:PALET
TE2,32:PALETTE3,63:PALETTE4,13:P
ALETTE5,21:PALETTE6,36:PALETTE8,
0:PALETTE9,14:PALETTE10,32:PALET
TE11,63:PALETTE12,32:PALETTE13,3
6:PALETTE14,7
460 GOTO 490
470 '**** RGB COLOR PALETTES ***
**
480 PALETTE0,0:PALETTE1,7:PALETT
E2,56:PALETTE3,63:PALETTE4,8:PAL
ETTE5,34:PALETTE6,54:PALETTE8,0:
PALETTE9,3:PALETTE10,56:PALETTE1
1,63:PALETTE12,56:PALETTE13,48:P
ALETTE14,32
490 POKE65496,0:PLAY"V20;T2;L8;A
;O4;L16;C;L4;C;O3;L16;B-;L16;A;L
8;G;L4;A;L4;B-;L4;B;O4;L4;C;L8;D
;L16;F;L4;F;L16;G;L16;F;L8;D;L4;
```

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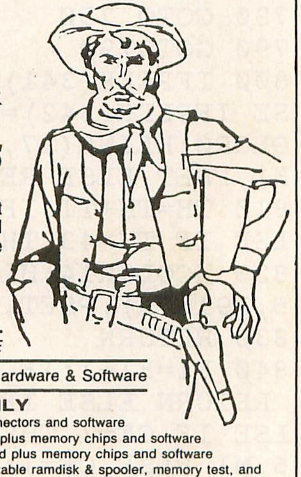

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```
C":POKE65497,0:T=0
500 T=T+1:IF T>1000 THEN 520 ELS
E IF BUTTON(0)<>0 THEN 520
510 IFINKEY$="" THEN 500
520 HSCREEN0:POKE &HFF9A,0:ATTR3
,0:CLS:PRINTTAB(5)"F-15 Ground A
ssault Simulator":ATTR2,0:PRINTT
AB(7)"Written By: Eric A. Wolf":
ATTR1,0:PRINTSTRING$(40,"-");
530 LOCATE6,12:ATTR2,0:PRINT"Ent
er Difficulty Level (0-9)"
540 LOCATE19,14:ATTR3,0
550 A$=INKEY$:IFA$<"0" ORA$>"9"
THEN 550 ELSE PRINTA$;:SOUND200,
1
560 ATTR3,0:LOCATE7,22:PRINT"Sta
nd by.... For Level "+A$:LV$=A$:
LV=VAL(A$)
570 POKE &HE6,2 'SETUP FOR HSCRE
EN 2
580 HCLS0:HCOLOR3:HDRAW"BM0,0;BF
6BU2BR4NG4E4R292F8D118G8L292H8U1
18":HPRINT(0,17),"Thrust":HPRINT
(8,17),"Radar":FORY=146 TO 192 S
TEP11.5:HLINE(8,Y)-(12,Y),PSET:H
LINE(10,Y+5.75)-(12,Y+5.75),PSET
:NEXTY
590 HLINE(54,146)-(110,192),PSET
,B:HLINE(16,146)-(26,192),PSET,B
:HCOLOR14:HLINE(17,169)-(25,190)
,PSET,BF:HCOLOR3:HPRINT(15,23),"
Fuel":HLINE(160,184)-(319,192),P
SET,B:HPAINT(168,188),6,3:HCIRCL
E(160,158),20
600 HPRINT(28,17),"F-15 Ground":
HPRINT(30,18),"Assault"
610 FORY=138 TO 178 STEP 8:HLINE
(132,Y)-(136,Y),PSET:HLINE(184,Y
)-(188,Y),PSET:NEXTY
620 HPRINT(28,21),"Play Level "+
LV$:HLINE(7,46)-(313,46),PSET:HP
AINT(160,45),4,3
630 HCOLOR5:HLINE(7,58)-(7,46),P
SET:FORY=7 TO 313 STEP 16:HLINE-
(Y,RND(16)+30),PSET:NEXTY:HLINE-
(313,58),PSET:HLINE(7,58)-(313,5
8),PSET:HPAINT(160,57)
640 HCOLOR12:HLINE(7,58)-(7,50),
PSET:FORY=7 TO 313 STEP 12:HLINE
-(Y,RND(16)+40),PSET:NEXTY:HLINE
-(313,58),PSET:HLINE(7,58)-(313,
58),PSET:HPAINT(160,57):HCOLOR3:
HLINE(7,58)-(313,58),PSET:HPAINT
(160,59),13,3
650 P2=130:Y=59:T=2:F=318:X1=7:X
2=313:GOSUB660:GOTO690
660 HCOLOR7:HLINE(X1,Y)-(X2,Y),P
SET:HCOLOR15:IF Y+(T/2)<128 OR Y
+(T/2)<P2 THEN HLINE(X1,Y+(T/2))
-(X2,Y+(T/2)),PSET
670 Y=Y+T:T=T+(T/2):IF Y>128 THE
N 680 ELSE 660
680 RETURN
690 FOR X=55 TO 110STEP3:HSET(X,
150,2):HSET(X,160,2):HSET(X,170,
2):HSET(X,180,2):HSET(X,190,2):N
EXTX
700 FORX=147 TO 191 STEP3:HSET(5
5,X,2):HSET(65,X,2):HSET(75,X,2)
:HSET(85,X,2):HSET(95,X,2):HSET(
105,X,2):NEXTX
710 HDRAW"BM82,168;C3;NG4F4U1H4G
4"
720 POKE &HE6C6,18:POKE &HE6C7,1
8:HSCREEN2:TH=21:L=1:L1=PEEK(&HF
FBD):L2=PEEK(&HFFB5):SW=0:PLAY"T
255L255;V31;":PO=1:PN=1:TIMER=0:
P1=140:P2=96:M1=PEEK(&HFFB6):M2=
PEEK(&HFFBE):HT=0:TT=1:E1=130
730 PLAY"T255L255":FORY=31 TO 1
STEP-1:PLAY "V"+STR$(Y)+";FBFCFD
":NEXTY:PLAY"V31"
740 HGET(E1,56)-(E1+8,58),7
750 SW=SW+1:IF SW>((46-TH)/9) TH
EN SW=0:IF L3=0 THEN POKE &HFFBF
,L1:POKE &HFFB7,L2:L3=1 ELSE L3=
0:POKE &HFFBF,L2:POKE &HFFB7,L1
760 ON L GOSUB 1000,1060,1200,11
20,800,840,870,1100
770 L=L+1:IF L>8 THEN L=1
780 GOTO 750
790 GOTO790
800 IFPEEK(341)=247 THEN TI=2 EL
SE IFPEEK(342)=247 THEN TI=-1:HC
OLOR0:HLINE(17,190-TH)-(25,190-T
H),PSET ELSE RETURN
810 TH=TH+TI:IF TH<0 THEN TH=0 E
LSE IF TH>43 THEN TH=43
820 HCOLOR14:HLINE(17,190-TH)-(2
5,191-TH),PSET,BF
830 RETURN
840 F1=F1+1:IF F1<(48-TH)/6 THEN
 RETURN ELSE IF F>210 THEN 850 E
LSE IF CF=1 THEN CF=0:POKE &HFFB
6,M1 ELSE CF=1:POKE &HFFB6,M2
850 F1=0:HLINE(F,185)-(F,190),PR
ESET:PLAY"CC":F=F-1:IF F>160 THE
N RETURN
860 GOTO 910
870 IF G=1 THEN G=0:GOTO 1120 EL
SE G=1
880 A=PO:HCOLOR0:GOSUB890:A=PN:H
```

```
COLOR3:GOSUB890:PO=PN:RETURN
890 IF A=1 THEN HDRAW"BM160,158;
NG12NE12BF4G4E8" ELSE IFA=2 THEN
 HDRAW"BM160,158;NL16NR16BD4L4R8
" ELSE HDRAW"BM160,158;NF12NH12B
G4H4F8"
900 RETURN
910 T=TIMER:HSCREEN0:CLS:ATTR3,0
,B:PRINTTAB(4)"<<==- YOU RAN OUT
 OF FUEL ! -==>>":GOTO930
920 T=TIMER:HSCREEN0:CLS:ATTR3,0
,B:PRINTTAB(4)"<<==- YOU WERE SH
OT DOWN -==>>"
930 POKE&HFF9A,0:PLAY"T255L255;V
31;":FORY=1TO5:FORX=1TO12:PLAY S
TR$(X):NEXTX,Y:ATTR2,0:LOCATE0,5
:PRINT"Flight Time":LOCATE30,5:P
RINTINT(T/3600);":";INT((T-INT(T
/3600)*3600)/60);:LOCATE0,7:PRIN
T"Hit/Miss Rating"
940 IF TT=0 THEN I=0 ELSE I=INT(
100*(HT/(TT-1)))
950 LOCATE30,7:PRINTI;"%"
951 LOCATE0,9::PRINT"Total Score
:":LOCATE30,9:PRINT(I*10*(LV+1))
:FORY=1TO1000:NEXTY
960 LOCATE10,16:PRINT"Play anoth
er game ?"
970 A$=INKEY$:IF BUTTON(0)=0 AND
 A$="" THEN 970
980 IF BUTTON(0)<>0 THEN 150 ELS
E IF A$="Y" THEN 150 ELSE IF A$=
"N" THEN CLS:END ELSE 970
990 ATTR0,0:PALETTE RGB:STOP
1000 P3=JOYSTK(0):P4=JOYSTK(1):P
4=63-P4:IF P3<16 THEN PN=1:P1=P1
-4:P1=P1-(TH/11) ELSE IF P3>48 T
HEN P1=P1+4:P1=P1+(TH/11):PN=3 E
LSE PN=2
1010 P1=INT(P1):IF P1<15 THEN P1
=15 ELSE IF P1>265 THEN P1=265
1020 IFP4<26 THEN P2=P2-4:P2=P2-
(TH/22) ELSE IF P4>36 THEN P2=P2
+4:P2=P2+(TH/22)
1030 P2=INT(P2):IF P2<64 THEN P2
=64 ELSE IF P2>107 THEN P2=107
1040 HPUT(P1,126)-(P1+40,132),1,
PSET
1050 RETURN
1060 ON PN GOTO 1070,1080,1090
1070 HGET(P1+10,P2)-(P1+28,P2+18
),2:HPUT(P1+10,P2)-(P1+28,P2+18)
,4,PSET:RETURN
1080 HGET(P1,P2)-(P1+40,P2+6),2:
HPUT(P1,P2)-(P1+40,P2+6),3,PSET:
RETURN
1090 HGET(P1+10,P2)-(P1+28,P2+18
),2:HPUT(P1+10,P2)-(P1+28,P2+18)
,5,PSET:RETURN
1100 IF PN=2 THEN HPUT(P1,P2)-(P
1+40,P2+6),2,PSET:RETURN ELSE HP
UT(P1+10,P2)-(P1+28,P2+18),2,PSE
T:RETURN
1110 RETURN
1120 IF BUTTON(0)=0 THEN RETURN
ELSE TT=TT+1
1130 HCOLOR 14:ON PN GOSUB 1170,
1180,1190
1140 PLAY"F":HCOLOR 13:ON PN GOS
UB 1170,1180,1190
1150 IF FP<E1 OR FP>E1+6 THEN RE
TURN ELSE HT=HT+1:SOUND100,1:HDR
AW"BM"+STR$(INT(54+(E1/6)))+",15
2;C0;U1R1D1L1":HPUT(E1,56)-(E1+8
,58),7,PSET:E1=RND(250)+25:HGET(
E1,56)-(E1+8,58),7:RETURN
1160 RETURN
1170 HLINE(P1+9,P2+18)-(P1+18,60
),PSET:HLINE-(P1+27,P2),PSET:FP=
P1+18:RETURN
1180 HLINE(P1+6,P2+4)-(P1+20,60)
,PSET:HLINE-(P1+32,P2+4),PSET:FP
=P1+20:RETURN
1190 HLINE(P1+9,P2)-(P1+18,60),P
SET:HLINE-(P1+27,P2+17),PSET:FP=
P1+18:RETURN
1200 HDRAW"BM"+STR$(INT(54+(E1/6
)))+",152;C0;U1R1D1L1":HPUT(E1,5
6)-(E1+8,58),7,PSET:E2=INT(RND(L
V)*3.5):IF RND(2)=1 THEN E1=E1+E
2 ELSE E1=E1-E2
1210 IF E1<18 THEN E1=18 ELSE IF
 E1>274 THEN E1=274
1220 HGET(E1,56)-(E1+8,58),7:HPU
T(E1,56)-(E1+8,58),6,OR:HDRAW"BM
"+STR$(INT(54+(E1/6)))+",152;C3;
U1R1D1L1"
1230 IF RND(11-LV)<>1 THEN RETUR
N ELSE IF E1+4<P1-4 THEN RETURN
ELSE IF E1+4>P1+24 THEN RETURN
1240 HGET(E1+4,56)-(E1+4,P2+8),8
:HCOLOR15:HLINE(E1+4,56)-(E1+4,P
2+8),PSET:PLAY"AB"
1250 IF (E1+4<P1+10 OR E1+4>P1+3
0) THEN HPUT(E1+4,56)-(E1+4,P2+8
),8,PSET:RETURN ELSE PALETTE14,3
2:FORY=31 TO 1 STEP-1:HCIRCLE(E1
+4,P2+8),(31-Y),14:PLAY"V"+STR$(
Y)+";CDCD;P30":PALETTE 11,RND(64
)-1:FORX=1TO15:NEXTX:NEXTY:PALET
TE11,63:GOTO920
```

Technicians Tackle Shifty Display

By Marty Goodman
Rainbow Contributing Editor

I have a CoCo 1 and 2, two CoCo 3s, three Zenith televisions, a CM-8 monitor and some other brands of TVs. When I hook either of the CoCo 3s to the Zenith TVs, the picture jumps a little. This does not happen when I hook the CoCo 3 to either a CM-8 or another brand of TV. Nor does it happen when I hook the CoCo 1 or the CoCo 2 to the Zenith TVs. Can you help me?

Wooten A. York
Lincolnton, GA

I have heard a dozen or so reports via Delphi of problems with a jumpy picture with the CoCo 3. I'm still not really sure what the problem is. However, Tandy has noted a different, but perhaps related, video problem with the CoCo 3. It seems that on some CoCo 3s when you power them up, the 32-column display either is missing or is shifted over one or two horizontal character spaces to the left and will wrap around on the same line on the right.

They discovered two possible causes: In some cases, the GIME chip was poorly seated in its socket, with some of its pins making poor contact. In that case, they advised their repair technicians to remove the GIME chip (a very delicate matter!) and clean both it and its socket with alcohol, then carefully reinsert it.

They also noted that in some cases there was a problem with a capacitor in the clock circuit. In this case, they advised their technicians to replace C-64 (which is originally 150 picofarads) with a 220-picofarad capacitor. I'm not sure whether either of these manipulations will help with your particular problem, but you might want to try them.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Pin Assignments

I have a book that describes the pinout of the CoCo's parallel port and lists one of them as +12V and another as -12V. Does this mean that the book only applies to the CoCo 1? What are the pin assignments for the CoCo 2? Where can I find books with specs on the 7400 series of IC logic chips?

Steve Roy
Cincinnati, OH

The book you have is probably the old, green "Technical Reference Manual" for the ancient CoCo 1 'D' board. What you are calling the "parallel port" is more accurately termed the CoCo's "system bus." As it happens, the pin assignments for that system bus are *exactly* the same on all models of CoCo, with the one exception: Those two pins you mentioned (the + and - 12-volt pins) are, on the CoCo 2 and 3, not connected to anything. Other than that, all pin assignments are the same.

Actually, much of the CoCo's circuitry has remained fundamentally the same through all revisions of the machine. But to get an accurate reference for your particular model CoCo, you should order the service manual for that particular model. The price will be around $12. These service manuals tend to be extremely well-written and very educational.

As for the 74 series of logic chips, National Semiconductor, Motorola and Texas Instruments all publish extensive reference books on these items. Call your local representative for any of these companies and find out how to order one. They might give you one free. These books are often on sale at technical book stores, too.

Disk Access Problem

A friend complained to me of a Color Computer that shows garbage on the screen on the right-hand side during disk access. It appears to work well otherwise. Have you any idea how to cure this?

Dave Archer
(DAVEARCHER)

In a Technical Bulletin to its repair technicians, dated May 23, 1985, Tandy discusses this problem. They say it can be cured by soldering 10K-ohm, pull-up resistors to the A0 and A1 pins on the main system bus of the CoCo. That is, solder a 10K resistor between the pad for the A0 line of the system bus and a source of +5 volts (which can be found at Pin 9 of the connector, as well as at about a hundred other places on the board). Then do the same for the A1 line. Note that to reach the A1 line you will probably have to take off the motherboard and work on the solder side, whereas it is possible to accom-

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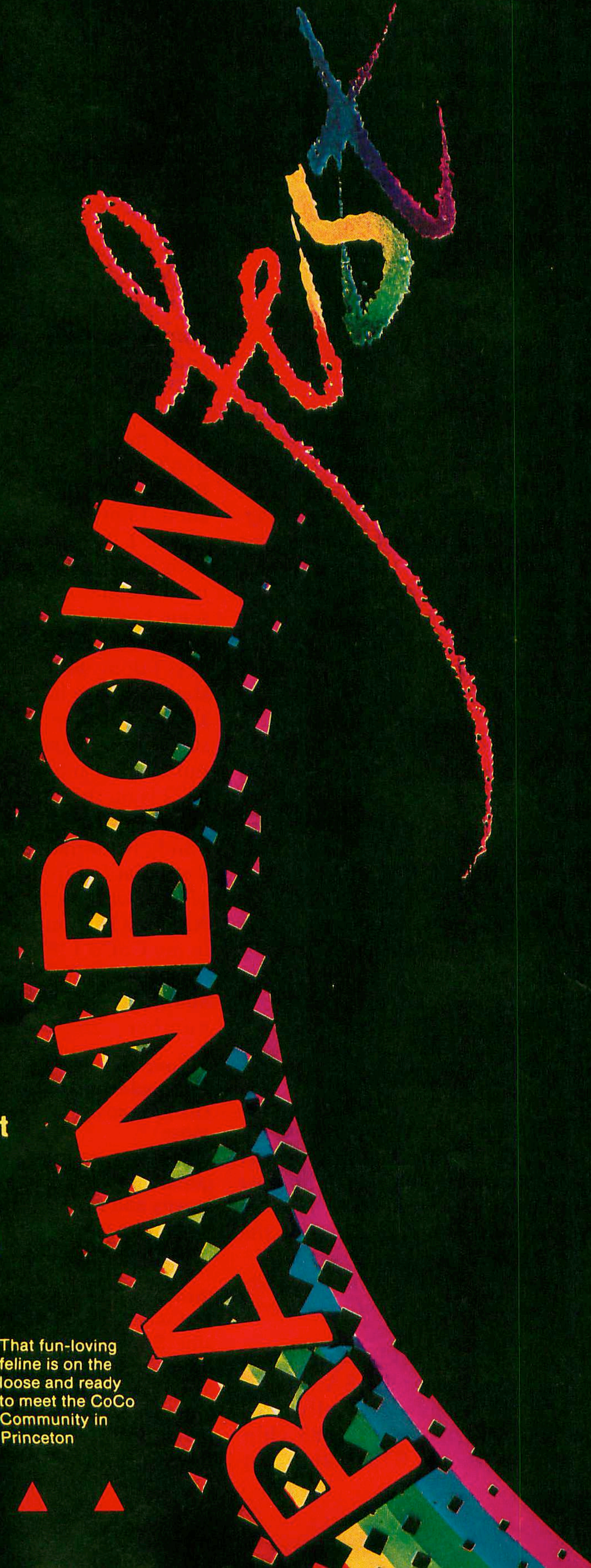

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RAINBOWfest is a **great opportunity** for commercial programmers **to show off new and innovative products for the first time.** Princeton is the show to get information on capabilities for the new CoCo 3, along with a terrific selection of the latest CoCo 3 software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

To make it easier for you to participate, we schedule RAINBOWfests in different parts of the country. If you missed the fun in Chicago, why don't you make plans now to join us in Princeton? For members of the family who don't share your affinity for CoCo, RAINBOWfest is located in an area with many other attractions.

A special feature of RAINBOWfest is the **Educational Sandbox**, which features **child-oriented workshops** to give hands-on experience to an age group often neglected. There are sessions for the kindergarten through third-graders, and for fourth- through seventh-graders. And, as an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

The Hyatt Regency Princeton offers special rates for RAINBOWfest. The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get your special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

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Sunday
- Exhibits open from 11 a.m. to 4 p.m.

Come meet CoCo Cat in person!

That fun-loving feline is on the loose and ready to meet the CoCo Community in Princeton plish the addition of the pull-up to the A0 line without removing the board.

Seeking Schematics

I have some Disto equipment and am interested in getting the schematic diagrams for it. These have not been available in the past. Can you help me?

Dennis Skala
(DENNYSKALA)
Fairview, PA

I am pleased to announce that CRC/Disto has started providing schematic diagrams for their products. Currently, diagrams of their later revision RAM disk card and their later revision Super Disk Controller card are available. Regrettably, the schematic they released of the Super Disk Controller, while showing the main disk controller circuitry, still does not show the details of the ROM select circuitry. Still, the information they have released is a giant step in the right direction.

Disto also has information available on how to upgrade early model Super Controllers to make them work with the CoCo 3 (there were some problems with some of these early models) and information on how to upgrade the earliest model RAM disk card to allow it to function at 2 MHz, making it usable with OS-9 Level II on the CoCo 3. Disto will perform these upgrades for you for a reasonable service and shipping fee, or it will provide you with the information you need to do it yourself. Both of these sets of upgrade instructions are also posted on Delphi in the CoCo SIG Hardware Hacking topic area.

Six-Pin DIN

Where can I get a cable to hook my new Magnavox Monitor 40 to my CoCo 3's RGB port? This monitor has a six-pin DIN socket for RGB input and also features composite video input. I can make one up myself if you tell me how.

Jason McCampbell
St. Johns, MI

Your "Magnavox Monitor 40" is probably the Magnavox 8CM505 monitor, judging from your description of it. This monitor (and also the Magnavox 8CM515 and 8CM643) all have the same sort of six-pin DIN RGB input jack. To make up a cable for it, you need 6 feet of 10-conductor ribbon cable, to which you must crimp a 10-conductor female dual in-line IDC connector, of the sort that mates to the CoCo 3's RGB connector. This connector is not available at Radio Shack, but can be ordered from major electronic supply houses. You also need a six-pin DIN connector, available at Radio Shack.

Then, all you do is hook pins on the Magnavox connector to pins with the identical signal function on the CoCo RGB connector:

	CoCo 10-pin RGB	Magnavox six-pin DIN RGB
ground	1, 2	3
red	3	4
green	4	1
blue	5	5
H sync	8	2
V sync	9	6 (center pin)

CoCo RGB connector pins 6, 7 and 10 are not used in this cable arrangement.

You are quite lucky that the Magnavox takes separate and upgoing sync for its RGB input — just the type of sync the CoCo 3 provides! Note that some other RGB monitors (like the Sony KV1311CR) require combined and down-going sync, which in turn require a sync combiner circuit in order to accept the CoCo 3's RGB signals.

SAM Chip Assessment

In your February 1987 column, you wrote that the 74LS785 is significantly better than the old 6883 SAM chip. Is this chip pin-compatible with the older CoCos? Where can I get one? My store manager here in Canada refuses to help me acquire one.

Also, I just discovered that the F, N and V keys won't work on my CoCo. My G and SHIFT keys have just died, too. When I try my keyboard on my friend's CoCo, it works fine, but his fails in the same way on my CoCo. I noticed that my 6821 (U17 on my CoCo 'F' board) is running hot too. Is this the problem? Where can I get a new 6821?

Steven Stady
Colinton, Alberta

If your CoCo is working fine, there is no reason to replace the SAM chip. The 74LS785 is indeed totally pin-compatible with the older 6883 chip (also known as 74LS783) and can simply be dropped into older CoCos, where it will work just fine. If you were having problems with your old SAM, however, it is possible that this new one, which has somewhat refined internal timing, may work better. It also may run cooler and last longer.

The part number for the 74LS785 chip is MX-6433. When ordering it, say you want "a 74LS785, Part Number MX-6433, for a CoCo Catalog No. 263134A." In the U.S., Radio Shack stores can order parts directly from National Parts. You may have to call Fort Worth and order the part yourself.

As to your second problem, U17 has nothing to do with reading the keyboard, which is governed by U18, the 6822 chip. But U17 (the 6821) should *not* be running hot to the touch, and so it may need replacement. Before you run around replacing chips without knowing what you are doing, I strongly urge you to get a service manual for your particular model CoCo. If you don't have a schematic and technical reference for your machine, you really should not be attempting any repairs.

The F,V, period and N keys (along with the right arrow and 6 key) are all in the same column of the keyboard scan, hooked to Wire Number 15 of the keyboard connector. The G and SHIFT keys (along with the O, W, space, 7 and slash key) are in the column hooked to keyboard Line Number 16. Thus, I suspect that either at least two lines are out on your motherboard, or your U18 6822 is on the fritz.

All CoCo parts can be ordered from Tandy National Parts. The 6821 chip is a standard chip available from dozens of electronic parts suppliers. The Tandy National Parts number for the 6821 chip in my CoCo 1 'F' board service manual is 8040821, and for the 6822 chip is 8040822. The 'F' board is catalog number 26-3004A.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

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A Guide to RGB Analog Monitors for the CoCo 3

By Marty Goodman
Rainbow Contributing Editor

The term "RGB monitor" refers to those color monitors that accept luminance information for red, green and blue intensities on three separate wires. All such monitors must also be given synchronization ("sync") information. This is accomplished by providing sync pulses either combined with the green luminance line, on a single separate wire (Sony), or via two separate wires.

Other things that can vary on RGB monitors are whether the luminance information is sent in analog or digital fashion, the exact details of the timing of the sync information, the voltage levels the monitor wants to see on the R, G and B lines, and the horizontal scan rate of the monitor. I want to make it clear that there is no such thing as a standard RGB monitor.

Analog Versus Digital

One of the major divisions among the many sorts of RGB monitors is between "analog" and "digital" (sometimes also called TTL, RGB I or RGB X) RGB monitors. The Color Computer 3 must have an analog RGB monitor in order to resolve its full palette of 64 colors. Most inexpensive RGB monitors on the market today are digital RGB monitors, and cannot be used to display more than eight colors with the CoCo 3, and even for that it takes a special hardware adapter (currently made and sold by J&M Systems). The reason digital RGB monitors are so prevalent is that the two most common RGB protocols used with IBM PCs and clones are digital in nature. These are the Color Graphics Adapter standard (CGA RGB I) and Enhanced Graphics Adapter (EGA RGB). The 'I' refers to the presence of a separate intensity line in the signal protocol.

On a given line, digital RGB monitors can recognize only an "on" or "off" condition. Thus, on the CGA protocol, the R, G and B intensity at a given point can be only either on or off. This yields capability to display a total of eight different colors. By adding an I line that can exist in either of two states (on or off) the IBM CGA standard is able to double this and display a total of 16 different colors. The IBM EGA standard adds an extra R, G and B line and so allows for 8 by 8 or 64 possible color combinations. IBM EGA standard also involves a faster horizontal scan rate, allowing for greater vertical resolution.

Analog RGB monitors do not need or use intensity lines. Instead, intensity information is conveyed by the exact voltage on each of the red, green and blue lines. This voltage may vary continuously, and, in theory, an RGB analog monitor can express 16 million or more different colors. In practice, the number of different colors an RGB A monitor can resolve will be limited by how finely the computer driving it is capable of varying the R, G and B signal levels. In the Color Computer 3, the GIME chip reserves a total of two bits per luminance line for specifying voltage and thus can set the R, G and B lines to one of four different voltage levels, allowing for 4 by 4 by 4 or 64 different total colors in its palette. By comparison, the Atari 520 and 1040 ST systems allow for three bits of voltage level data on each of the luminance lines. They can set the R, G and B lines to any one of eight voltage levels and so can resolve a total of 512 different colors in the palette. The Amiga, allowing four bits per luminance line, has provisions for any of 16 different voltage levels on its R, G and B lines, resulting in a total of 4,096 colors in its palette. The IBM "PGA" standard (a seldom-used analog RGB protocol used on some IBM systems) also can resolve a total of 4,096 colors.

Analog RGB protocol is used for professional video signal transmission. This is because its analog nature allows expression of the full range of possible colors. Its separate transmission of RGB and sync information allows for much greater image resolution than does the "mushy" composite color video protocol commonly used on most home video equipment. In composite color video, all of the color and sync information is mashed into a single wire. The result is reduced signal quality.

Martin H. Goodman, M.D., is a longtime electronics tinkerer and lives in San Pablo, California. Marty is a RAINBOW contributing editor and writes the "CoCo Consultations" column. He is also the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online on Delphi.

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Monochrome as an Option

Note that it is the mashing of all the color information into a single wire that causes the degradation of signal quality. Composite monochrome signals are usually of quite fine resolution. Color picture tubes of fine-resolution phosphor are difficult and expensive to produce. This is due to the need to lay down extremely tiny dots or stripes of red, green and blue phosphor, fabricate and precisely position inside the tube a "shadow mask" to allow the electron beam to individually light up each cluster of red, green and blue phosphors. In a monochrome monitor, a single phosphor is "smeared" continuously across the surface of the tube, and there is no need for a shadow mask. All of this makes a color monitor with resolution equivalent to a monochrome monitor cost six to 10 times as much.

If all you want is to resolve 80-column text, then perhaps you don't need an RGB monitor at all, but rather a composite monochrome monitor. Tandy sells one such (the VM-4), and so do Computerware, Howard Medical and other RAINBOW advertisers. Tandy's VM-4 is perfectly compatible with the CoCo 3 and will sharply resolve 80-column text. Indeed, the 80-column text you get with the $115 VM-4 is somewhat sharper than that which you would get using a $600 NEC Multisync RGB monitor.

What Monitors Work With a CoCo 3?

When looking for an RGB monitor for the CoCo 3, you need to get an *analog* RGB monitor. Most monitors advertised as "digital," "TTL," "IBM-compatible," or "RGB I" will *not* work with a CoCo 3. However, a few monitors have been designed to provide a variety of different inputs, including RGB I, RGB A and, in some cases, composite video. These monitors are most desirable to CoCo 3 owners. Such monitors will work fine with an IBM PC or Tandy 1000 or similar clone, and will work fine with a CoCo 3. Monitors that also have a composite video input will allow CoCo 3 owners to view the vast number of CoCo games and educational software written over the last five years using "artifact colors." Any attempt to display such "artifact colors" on an RGB A-only monitor will result in the screen appearing in black and white.

Shopping for an RGB A Monitor for Your CoCo 3

As I have noted in some "CoCo Consultation" columns, there are many factors that make up a good RGB monitor. Some are product specifications and others are seldom measured or listed. But the bottom line is that *no* combination of product specs will tell you exactly which RGB A monitor is better than another. You must look at the image made by the CoCo 3 on all monitors and compare. This is difficult because the different RGB A monitors are never sold in the same stores and often are hard to find, or they are available only by mail order. It is even more difficult because for each different monitor, a special RGB A cable usually has to be made up. Over the last three months, I have viewed the CoCo 3's output on six different RGB A monitors.

> ***"If all you want is to resolve 80-column text, then perhaps you don't need an RGB monitor at all, but rather a composite monochrome monitor."***

Probably the most relevant of the commonly listed specifications for RGB monitors is the "stripe width" (or, for those monitors whose phosphor is laid down as dots, the "dot diameter" or "dot pitch"). Ed Ellers, RAINBOW Consulting Editor, tells me that .50mm stripe width is often considered, by rule of thumb, the absolute minimum needed for proper resolution of 80-column text. The monitors I discuss below feature stripe widths ranging from .65mm to .25mm. Note that unless we are talking about monitors that all have the same size tube, the stripe-width figures have to be "normalized" to the tube size in order to provide a meaningful comparison of the resolution of the system. That is, a 26-inch diagonal monitor with a stripe width of .74 will be able to resolve exactly the same sharpness of image as a 13-inch diagonal monitor with a stripe width of .37mm. Obviously, the issue here is the total number of stripes per horizontal line. The monitors we compare are all in the 12- to 14-inch diagonal measure range. I judge this range to be sufficiently narrow, so I will not attempt to "normalize" the stripe widths to tube size.

Tandy CM-8

This is the monitor Radio Shack specifically designed to work with the Color Computer 3. It has a phosphor rated at .52mm stripe width and provisions for only CoCo 3 type analog inputs. The diagonal tube measure is 13 inches. It will not work with any other type of computer, nor will it work with a VCR. It cannot display artifact colors because it lacks a composite video input. The resolution of 80-column text is adequate, but not strikingly crisp. Its screen image is somewhat dimmer than that of the other RGB monitors discussed in this group. In addition, many owners have complained that the cable provided is a tad short. On the positive side, it is (at the $250 mail order price) by far the least expensive RGB A monitor available that will work with the CoCo 3. Should it develop problems, it can be serviced via any Radio Shack store. Spectrum Projects sells an RGB video extender cable that can add about 6 feet to the length of the CM-8's (or any other CoCo RGB monitor's) cable, without substantial loss of signal quality. The CM-8 is by far the easiest CoCo 3 RGB A monitor to find. Because of its availability and low price, the CM-8 from Tandy is likely to be the most popular CoCo 3 RGB monitor.

The Magnavox "Professional" 8CM515 Monitor

This was the first CoCo 3 RGB A monitor I owned, and it is the one currently used by Steve Bjork, Richard Esposito ("Doctor ASCII") and Paul Searby (founder of Computerware). It has a rated stripe width of .42mm and a tube measure of 13 inches diagonally. It features provisions for RGB I, RGB X, RGB A and composite video inputs and boasts a frosted anti-glare screen. It also has audio inputs and a switchable comb filter. It will work with IBM PCs (CGA RGB I protocol), CoCo 3s (RGB A), CoCo 2s and VCRs (composite color video) and can resolve artifact colors on the CoCo 3. You can switch between RGB A and composite video inputs via a convenient push button on the front panel of this monitor. It resolves 80-column text a bit more sharply than does the CM-8 from

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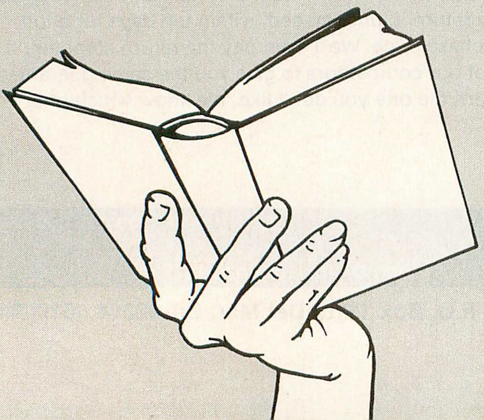

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Tandy, and its screen image is somewhat brighter, as well. Its styling is compatible with the rest of the Color Computer system. The specific type of RGB A protocol that Magnavox uses is exactly the same as that of the Color Computer 3. Both use separate and upgoing H and V sync lines. Making a cable to hook the CoCo 3 to the Magnavox is easy. Merely obtain the appropriate 10-pin CoCo RGB A type connector and 6-pin DIN connector used on the Magnavox (the same as that used on the newer Tandy two-button joysticks) and, referring to the user manuals for the CoCo 3 and the Magnavox, merely hook R to R, G to G, B to B, H sync to H sync, V sync to V sync, and ground to ground. Sound is supplied via a separate phono connector that can hook to the CoCo 3's separate audio output.

As you can probably tell, I am impressed with the Magnavox 8CM515 monitor. But it does have some flaws. Its handling of composite video input is less than excellent. When used in composite video mode, some 8CM515s occasionally fail to pick up the color burst signal from the CoCo, resulting in a black and white image. A few of the Magnavox 8CM515 monitors I've tested have trouble accepting the vertical sync pulse from the CoCo 3, although in some cases, analysis indicated that the CoCo 3 in question had a marginal 74LS04 buffer chip, which needed to be replaced. Finally, while the video is a bit sharper than that of the Tandy CM-8, there still is some appreciable blurriness in the 80-column display. Not a whole lot, but some.

The Magnavox 8CM515 is approximately $100 more than a Tandy CM-8. It is currently being offered by Spectrum Projects and Howard Medical [See review on Page 140]. Both of these are RAINBOW advertisers. Spectrum Projects and SpectroSystems (of ADOS fame) also sell, separately, cables that can be used to hook the CoCo 3 to the Magnavox series of monitors. As I designed and, in most cases built, those cables, it would not be fair for me to review them. For the average CoCo 3 owner, when all is said and done, a Magnavox 8CM515 will end up costing about $330 to $350. In my opinion, the added cost is well worth the added quality and capability it yields, but the individual user and his pocketbook will have to be the final judge.

The Sony KV-1311CR

This has virtually all of the features of the Magnavox monitor (except for support for Apple's RGB X protocol), but features a somewhat brighter and sharper phosphor (.37mm stripe width). It also is a full-function, infrared remote control, 13-inch diagonal measure television! It has somewhat better quality circuitry for its color composite video input than does the Magnavox 8CM515.

This is the monitor that Bob Rosen, of Spectrum Projects, and I currently use on our CoCo 3s. When used with 80-column text, the image is very sharp with only a trace of fuzziness to the letters. When used to display CoCo 3 graphics, the images are extremely sharp and the colors quite vibrant. When used as a color TV, it produces a stunningly sharp picture, so much so that quite a few of my friends have, without prompting, remarked on its fine picture quality. There is one quirky trick to using the audio input on the Sony KV-1311CR: To use the separate phono jack audio input with the analog RGB input, you must simultaneously push down both the RGB and "Video" (composite color video) selector but-

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tons on the front panel so that they both lock in the ON position. Only then will you get RGB A video input and be able to pipe in sound through the RCA audio input jack on the side of the monitor.

Howard Medical Computers now offers the KV-1311CR for $449 (plus $15 S/H) and has the necessary cable for $36. Spectrum Projects also carries the cable to hook up a CoCo 3 ($40). The cables are complex and, therefore, expensive. Overall, I am very pleased with my Sony KV-1311CR.

Note: In a "CoCo Consultations" column I incorrectly stated that the Sony KV-1311CR had been discontinued. This was my mistake.

Hackers Note Regarding the Sony KV-1311CR

The Sony KV-1311CR uses a rather odd 34-pin RGB A connector, and its provisions for RGB A input are for a slightly different protocol than that used by the CoCo 3. The Sony wants to see a combined and down-going sync signal, whereas the CoCo produces separate and up-going sync signals. In order to hook it to the CoCo 3, you have to combine and then invert the sync lines from the CoCo 3. A single NOR gate on a 74ALS02 chip does this quite nicely. A second problem faced by would-be cable makers for the Sony KV-1311CR is that you need a source of +5 volts to power the 74ALS02 chip. The Sony does not supply this, and it is not present on the CoCo 3 RGB A connector either. Using a "sneaky trick" in commercial Sony RGB A to CoCo 3 cables that I designed for Spectrum Projects, I "stole" a source of +5 volts from one of the joystick connectors on the CoCo 3. Although note, on my own Sony, I opened the monitor and brought a source of +5 volts out to two of the unused pins on its 34-pin connector (pins 1 and 2). This enabled me to make a cable that did not have to take up one of the joystick ports. Regulated +5 volts is available on either Pin 14 of the 14-pin IC or Pin 16 of the 16-pin IC that is near the 34-pin RGB A connector on the vertical PC board inside the Sony.

Magnavox 8CM505

Despite the similarity of its model number to the Magnavox "Professional" 8CM515, the Magnavox 8CM505 is a less desirable beast. Its stripe width is only .65mm and cannot adequately resolve 80-column text. It is a possible choice for those who want to use the CoCo 3 for dedicated color graphics systems, for it will quite adequately resolve 320-by-200 pixel resolution graphics. Like the 8CM515, it features RGB A, RGB I and composite video inputs. In my area, Toys R Us sells this monitor for $200 plus tax. It can be hooked to the CoCo with the same cable used for the Magnavox 8CM515.

Magnavox 8CM643

If you run across a Magnavox 8CM643 monitor at a reasonable price, it might be a good choice for the CoCo 3. It is very similar to the 8CM515 except that it has a somewhat better quality picture tube that boasts a stripe width of .39mm (compared to the .42mm stripe width of the 8CM515).

NEC MultiSync

This monitor costs approximately $580 and is primarily of interest to IBM PC users who want support for high-quality EGA and PGA video screens. It is a very popular ultra-high-quality IBM video monitor, so RAINBOW readers encountering it may want to put it to use on their CoCo 3s. The NEC MultiSync boasts a dot width of .31mm. A 14-inch diagonal screen accepts analog RGB input. It also accepts IBM CGA, IBM EGA and IBM PGA inputs, although it does not have provisions for composite video input. Making a cable for it is easy. It uses standard DB 9 connectors and calls for the same up-going and separate sync arrangement as that used by the CoCo 3 in analog RGB mode. Its image is superbly crisp and sharp. Spectrum Projects sells CoCo 3 to NEC MultiSync cables, designed and manufactured by yours truly.

Sony CDP-1302 (Multiscan)

This is the finest quality monitor you can buy for under $1,000. Retailing for $800, it boasts a stripe width of.25mm, and its "multiscan" feature, like that of the NEC MultiSync, allows it to be used with the high resolution IBM EGA and PGA protocols as well as with the lower resolution IBM CGA and CoCo 3 RGB A type of video signals. Unfortunately, it lacks composite video inputs, so it cannot be used with the CoCo 2 or 3 to display artifact colors. As is the case with the NEC MultiSync, this monitor represents "overkill" when used with a CoCo 3. Unlike the NEC MultiSync, construction of a proper cable to hook it to the CoCo 3 is a little tricky, for the same reasons that hooking the Sony KV-1311CR to the CoCo 3 is tricky: its preference for combined and down-going sync pulses.

Teknika MJ305

This monitor offers support for both RGB A (CoCo 3 compatible) and RGB I (IBM CGA compatible) video signals. I saw it used with a CoCo 3 in a booth at Color Expo '87. It has a rated stripe width of .41mm and a diagonal measure of 14 inches. Its image has about the same quality as the Magnavox Professional 8CM515. Unfortunately, it costs a bit more than the Magnavox 8CM515 and does not have provisions for composite video input. Therefore, unless you get a good deal on it, I cannot recommend it.

Sony CDP-1310

This 13-inch diagonal measure, .37mm stripe width monitor offers the same fine display in Analog RGB video mode as does the Sony KV-1311CR. However, although it supports RGB I for the IBM CGA, it does not have provisions for composite video input. Thus, it lacks flexibility. Like the KV-1311CR, it is a little tricky to interface to the CoCo 3. Unlike the KV-1311CR, it uses a rectangular 8-pin RGB video connector.

Sony CDP-9000 and CDP-1201

These monitors are, respectively, 9 and 12 inches in diagonal screen measure. Both boast a super fine stripe pitch of .25mm, making them possessors of the finest resolution phosphors among these monitors discussed. Note that the CDP-9000, with only a 9-inch diagonal measure tube, offers roughly the same resolution as the KV-1311CR with its 13-inch tube and .37mm stripe width phosphor.

Both of these support only RGB A and CGA RGB I type inputs and do not provide for composite video. Like the CDP-1310, they use an 8-pin RGB connector and require combining and inverting of the CoCo 3's sync lines in order to work.

I've seen the CDP-9000 selling for as little as $250. At that price, if you are a hacker capable of making up a proper cable for it, it represents a better value than the CM-8 from Tandy, with a smaller screen size, of course.

The CDP-1201 is rather overpriced ($500) and under-featured (it lacks MultiSync capability), so unless you already own one or can get a real deal on one, I would not recommend it.

Sony KX-1211HG ("Profeel") Monitor

This is a 12-inch diagonal RGB monitor with similar properties to that of the KV-1311CR. It is an older unit and offers a slightly less fine stripe width on its phosphor. It still produces a good quality image. It has all the flexibility of input as the KV-1311CR (RGB I, RGB A, and composite video). It also features a more complex implementation of the Sony 34-pin RGB A "standard" connector, which includes support for stereo audio and, of greater interest to CoCo 3 owners, supplies regulated +5 volts on pins 1 and 2 of that connector. Thus, it is possible to make a "cleaner" RGB A CoCo 3 cable for an unmodified KX-1211HG. I've made two such cables for friends with this model of TV/monitor, and both are quite pleased with the images that resulted.

Sony KV-20XBR, KV-25XBR, KV-2011CR, KV-2511CR

These are 20- and 25-inch diagonal RGB monitors/TV sets. The 20-inch models offer .37mm stripe width, and the 25-inch models offer .55mm stripe width (the latter combination should be equivalent to a 13-inch monitor with a .29mm stripe width). I have not interfaced any to a CoCo 3, but suspect the process would be similar to that of hooking a KV-1311CR to it.

Miscellaneous Monitors

Beware of the Magnavox 8CM562 monitor! This monitor does *not* support RGB A and is of no use to CoCo 3 owners. Thomson is putting out a line of RGB monitors, but my preliminary assessment of that line is that it is overpriced and under-featured. Some don't have RGB A input and, of those that do, some lack composite video input. Their stripe widths are not that impressive. The Atari ST RGB Color monitor would seem to be a possibility for use with the CoCo 3. Superficially, all of its relevant video signals match those of the CoCo 3's output. But Atari slipped a joker into the deck by implementing an odd variant of sync timing. If you try to put up a CoCo 3 image on an Atari RGB monitor, the picture is shifted up and to the right to an extent that it cannot be compensated for with the external horizontal and vertical position adjustments. A video hacker could probably fix this. The Amiga model 1080 monitor might be usable with the CoCo 3, but, in RGB analog mode, it wants a combined down-going horizontal and vertical sync. I'd be interested to know if readers have gotten the Amiga monitor to work on a CoCo 3. The approach should not be more tricky than that which I used with the Sony KV-1311CR, unless the Amiga design has surprises similar to those in the Atari.

Conclusions and Recommendations

The information here will better enable you to make the best possible choice of RGB A monitor for your CoCo 3. Hopefully, if you encounter a monitor other than those described here, this article will have armed you with the knowledge needed to assess whether it is likely to work with a CoCo 3 and how good a value it represents.

There are three monitors I particularly recommend. The CM-8 from Tandy, though lacking in flexibility and image quality, represents the least expensive and most accessible CoCo 3 monitor. It's the easiest to have repaired.

The Magnavox 8CM515 represents the best compromise monitor I know of. Although priced a hundred dollars higher than the CM-8 from Tandy, it offers better quality and much greater flexibility of video input modes.

For those who want a little better quality, or who want the option of using their monitor as a TV at times, and who can afford to spend another $50 to $100, the Sony KV-1311CR would be the best bet.

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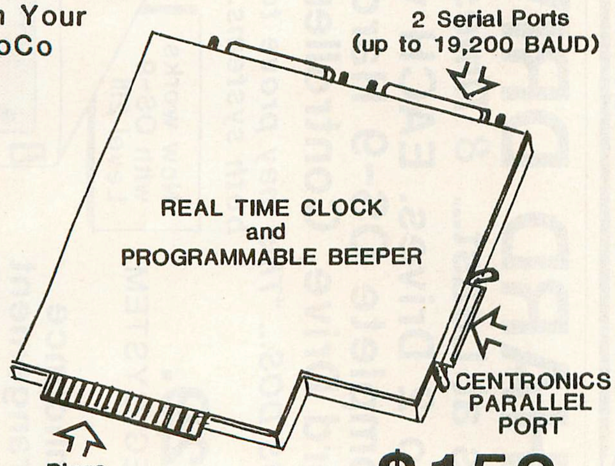

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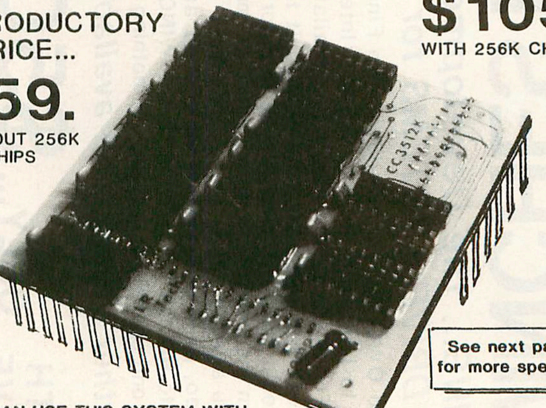

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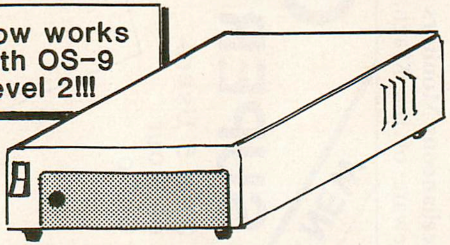

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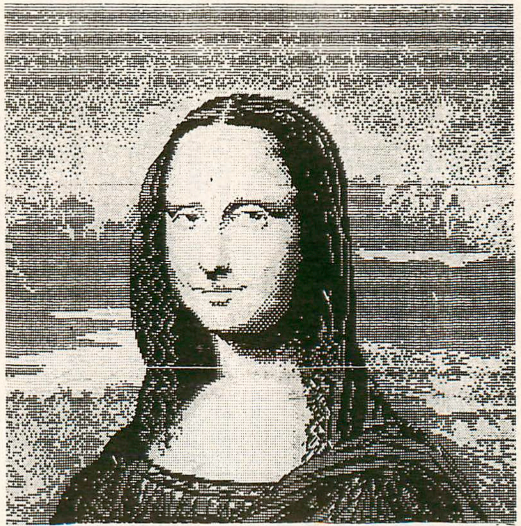

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	161,125	Christian Grenier, Valleyfield, Quebec
	149,190	Daniel Lesage, Laval, Quebec
KORONIS RIFT *(Epyx)*	84,830	★Thomas Beruheimer, Yoru, PA
	11,430	Timothy Hennon, Highland, IN
	2,785	Tony Rapson, Tulsa, OK
LANCER *(Spectral Associates)*	567,200	★Luke Birinyi, Pefferlaw, Ontario
	227,800	Andre Grenier, Valleyfield, Quebec
	178,800	Christian Grenier, Valleyfield, Quebec
	99,700	David Kauffman, South Haven, MI
LUNCHTIME *(Novasoft)*	42,025	★Steve Place, Webster, NY
	26,425	Joshua Conley, Springfield, OH
MICROBES *(Radio Shack)*	337,880	★Judy Haviland, Caldwell, ID
	121,330	Minesh Patel, Benton, AR
	77,700	Brian Abeling, Monticello, IA
MINIGOLF (THE RAINBOW, 5/86)	21	★Chris Lynd, Groesbeck, TX
	23	Daniel Bradford, Birmingham, AL
	23	Wilfrid Sloan, Newport-on-Tay, Scotland
	25	Richard Donnell, Penns Grove, NJ
	25	Billy Helmick, Independence, KY
	32	Chris Banas, North West Territories, Canada
MISSION: F-16 ASSAULT *(Diecom Products)*	468,750	★Karen Jessen, Cleveland, OH
	355,570	Stirling Dell, Dundalk, Ontario
	318,160	Jeremy Pruski, Sandwich, IL
	127,550	Michael Heitz, Chicago, IL
	120,670	Vernon Johnson III, Parkville, MD
	49,630	Edward Swatek, Chicago, IL
	45,500	Chuck Morey, Bakersfield, CA
	45,375	Chris Wright, New Albany, IN
OMNIVERSE *(Computerware)*	112	★Roy Grant, Toledo, OH
ONE-ON-ONE *(Radio Shack)*	1,204-0	★•Chad Johnson, Benton, AR
	1,160-0	•Mark Lang, Downieville, CA
	1,132-23	Dan Liffmann, Andover, MA
	1,106-15	Rick Beevers, Bloomfield, NM
	1,086-17	David Blankenship, Princeton, WV
	1,078-2	Toby Jacobs, Bellefontaine, OH
	1,064-16	Tim DeJong, Rock Valley, IA
	1,028-60	Jamie Keels, Gulfport, MS
PAC DROIDS *(Programmer's Guild)*	19,710	★Jody Ronning, Melrose, WI
PAPER ROUTE *(Diecom Products)*	1,120,350	★Neil Haupt, Elyria, OH
	1,059,350	David Kauffman, South Haven, MI
	830,950	Christopher Darden, Woodson Terrace, MO
	720,560	Konnie Siewierski, Schaumburg, IL
	531,600	Larry Shelton, Marion, IL
PINBALL *(Radio Shack)*	142,400	★Thomas Payton, Anderson, SC
PITSTOP II *(Epyx)*	51	★Christian Grenier, Valleyfield, Quebec
POOYAN *(Datasoft)*	99,500,300	★Danny Wimett, Rome, NY
	97,500,000	Rich Fiore, Clemson, SC
	54,500,000	Carlos Gameros, El Paso, TX
	3,785,000	Ben Collins, Clemson, SC
	1,987,000	Jon Sowle, Sanford, FL
	1,546,000	Jason Maxwell, Manchester, TN
QUIX *(Tom Mix)*	8,407,772	★John Haldane, Tempe, AZ
	1,404,000	Curtis Goodson, Sao Paulo, Brazil
	1,003,104	Elisa Goodson, Sao Paulo, Brazil
	205,335	John Hotaling, Duanesburg, NY
	104,034	Christopher Conley, North Attleboro, MA
	38,957	Patrick Martel, Laval, Quebec
	19,410	Thomas Crowe, Colombia, South America
RADIO BALL *(Radio Shack)*	6,330,350	★Myriam Ferland, Trois-Rivieres, Quebec
	4,510,740	Les Dorn, Eau Claire, WI
	1,945,110	Dominic Deguire, St. Basile, Quebec
	1,768,940	Brian Buss, Whitehall, PA
	1,631,750	David Del Purgatorio, Antioch, CA
RAIDERS (THE RAINBOW, 11/86)	2,100	★Dave Allessi, Iselin, NJ
REACTOIDS *(Radio Shack)*	483,020	★Henry Patterson, Marshall, TX
ROGUE *(Epyx)*	4,508	★Tony Rapson, Tulsa, OK
SALVAGE OF THE ASTRONAUTS (THE RAINBOW, 9/86)	1,090	★Spencer Metcalf, Longview, TX
SANDS OF EGYPT *(Radio Shack)*	87	★Neil Haupt, Elyria, OH
SANDWORM (THE RAINBOW, 8/86)	737	★Becky Rumpel, Arcadia, WI
SHAMUS *(Radio Shack)*	120,480	★Lynn Shrewsberry, Sunnyside, WA
	47,260	Jamie Keels, Gulfport, MS
	38,075	Kay Shrewsberry, Sunnyside, WA
SPACE AMBUSH *(Computerware)*	30,400	★Thomas Crowe, Colombia, South America
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SPIDERCIDE *(Radio Shack)*	6,170	★Talib Khan, Bronx, NY
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	2,550	Charles Marlow, Briarwood, NY
	2,000	Mike Watson, Northville, NY
	1,740	Joel DeYoung, Manson, Manitoba
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SUCCESS MANSION (THE RAINBOW, 1/87)	13/13	★Dave Allessi, Iselin, NJ
SUPER ROOTER (THE RAINBOW, 5/86)	3,910	★Daniel Bradford, Birmingham, AL
TUT'S TUMB *(Mark Data)*	60,020	★Don Siler, Muncie, IN
	45,000	Blake Cadmus, Reading, PA
VARLOC *(Radio Shack)*	2,032	★Tony Harbin, Cullman, AL
	2,008	Philip Puffinburger, Winchester, VA
	1,995	Denise Rowan, Minneapolis, MN
	1,988	Randall Edwards, Dunlap, KS
	1,975	Bernard Florence, Croydon, Australia
	1,968	Donnie Pearson, Arvada, CO
	1,952	Lynn Shrewsberry, Sunnyside, WA
	1,908	Domenick Doran, Coram, NY
VICIOUS VIC (THE RAINBOW, 7/86)	18,813	★Talib Khan, Bronx, NY
	10,489	Karl Gulliford, Summerville, SC
	6,294	Pat O'Neill, Nepean, Ontario
	4,643	Martha James, Swarthmore, PA
	3,285	Richard Donnell, Penns Grove, NJ
THE VORTEX FACTOR *(Mark Data)*	100/276	★Tommy Crouser, Dunbar, WV
	100/483	Rick & Brenda Stump, Laureldale, PA
	210	Paul Maxwell, Vancouver, British Columbia
WILDWEST *(Tom Mix)*	38	★Neil Haupt, Elyria, OH
WRESTLE MANIAC *(Diecom)*	546,315	★Louis Bouchard, Gatineau, Quebec
	39,086	Billy Helmick, Independence, KY
	5,000	Christian Grenier, Quebec, Canada
ZAXXON *(Datasoft)*	2,061,000	★Byron Alford, Raytown, MO
	1,950,000	Blake Cadmus, Reading, PA
	1,300,500	Dan Brown, Pittsford, NY
	1,100,600	Andrew Urquhart, Metairie, LA
	253,400	Bob Dewitt, Blue Island, IL
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	59,800	Garrett Stangel, Milwaukee, WI
	11,400	Mike Ells, Charlotte, MI

— Jody Doyle

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, which appears bimonthly, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

FEEDBACK

In response to letters from:

- Travis Stromer: In *Raaku-Tu*, go to the gargoyle's room, light the candle and leave. Go to a room or two and wait for a while, then go back to the gargoyle's room and extinguish the candle.
- Jason Thomas Wysokowski: To open the safe in *Vortex Factor*, go back in time to the old museum and go to the room with the desk. Open the desk and read the document inside.

Tony Warchules
Nanticoke, PA

- Jason Jones: In *Bedlam*, you cannot

open the cabinet. You must get the key in the hole with the window hook in order to open the red doors.

- Frank Morrison: In *Pyramid 2000*, you must drop the scepter and get the bird. You must have the box, though. When you get to the pharaoh's room, type `THROW BIRD`.

- Bill Hoban: In *Shenanigans*, you must find the woman in the clover field and type `PUSH WOMAN` in order to obtain the shamrock to kill the snake.

In *Sands of Egypt*, I can't find the scepter everyone is referring to in order to drain the pool, and I can't keep the rope from crumbling to dust. Is this rope useful?

In *Shenanigans*, I can't get the 12-foot pole into the cave.

David Davidson
Chicago Heights, IL

- David Harris: When in the casino in the *Interbank Incident*, take about $650 with you, go to the room with the roulette wheel and give the money to the roulette wheel.

When you get the "special dice" at the farmer's market, how do you use them?

Matt Smith
Fredericksburg, VA

Mummy Dearest

Scoreboard:

To get the bird statue in *Pyramid 2000*, you must be holding one specific item and not holding another. To get the Pharaoh's Treasure Chest after the mummy has stolen your treasure, go to the room where it says, "The west end of the hall of the gods." From here, go south to enter the maze.

To make it safely back to the jungle in *Raaku-Tu*, wait a little before you go up the hole.

When running *Cave Walker* on a CoCo 2 system, the CLEAR key works as a CONTROL key. Also, be sure to pick up seven locks before you try to get the first part of the key.

Brent Dingle
Norwalk, IA

Pin Problems

Scoreboard:

Could anyone tell me the actual situation and position necessary to pin someone in *Wrestle Maniac*? Also, is there any way to consistently hit 3-pointers in *One On One*?

Jeff Stewart
Charleston, IL

Pyramid Progression

Scoreboard:

In *Pyramid 2000*, after you have climbed the plant and collected the key and egg, what is next? What does the scepter have to do with the game?

Bo Van Cleave
Eugene, OR

Paint Me Crazy

Scoreboard:

In *Bedlam*, when I try to open the painted door, it says, "Are you crazy?" Also, I can't find the kennel.

Rusty Merritt
Pocomoke, MD

Unnecessary Quest

Scoreboard:

Does anybody have some tips on how to cut out some unnecessary moves in *Dallas Quest*?

Meagan Pufahl
Windsor, Ontario

'T' For Try

Scoreboard:

In *Sands of Egypt*, I can't find the torch and in *Raaku-Tu*, when I get the ring, I go back to the 'T'-shaped room and try to go to the gargoyle, but I go back to the statue and get killed.

Jaan Laansoo
Barrie, Ontario

Tricky Thickets

Scoreboard:

What can I do to find the pyramid in *Infidel*, and how do you get around the thickets?

Sean McDonough
Hillsboro, OH

Closed Cabinet

Scoreboard:

In *Bedlam*, you cannot open the cabinet in the dispensary. To get the red key out of the cabinet, go to the maintenance room and get the window hook, then go back to the dispensary and get the red key with the hook.

How do you get past the dog in *Bedlam*?

Rick A. Moore
Greensburg, IN

Stay Still Statue

Scoreboard:

I haven't found a way to get out of my cell in *Bedlam*. In *Sands of Egypt*, how can I get water?

In *Pyramid 2000*, I opened a panel but nothing happened. I tried what Danny Flores suggested, but I could not go up the stairs and didn't know what to do after I got to the bottomless pit. When in the pharaoh's room, I can't get past the serpent. I tried to get the statue, but it just moves away.

Brien Lougue
Paulina, LA

Shovel Shuffle

Scoreboard:

How do you get the small shovel in *Dallas Quest*?

Troy Phelps
Baraboo, WI

Dying With Nothing

Scoreboard:

In *Sands of Egypt*, I keep dying without finding anything.

Scott Melton
Seminole, OK

Secrets of the Inner Chamber

Scoreboard:

Some hints for *Sands of Egypt*: You have to have the canteen to drink water. The water is from the pool. You must dig to find the canteen. The snake oil is useful at the pyramid.

After translating the hieroglyphics, you place the object mentioned somewhere in the inner chamber. You only have to ride the camel once, not three times, to get to the pyramid.

I'm in the treasure room with the ladder and I'm stuck!

Anna Fiehler
Waipahu, HI

Ax Facts

Scoreboard:

In *Sands of Egypt*, do I need an ax? If so, where can I find it?

In *Dallas Quest*, how do I get down into the tunnel with my inventory or items?

Jeff Hurteau
Troy, NY

Sea the Seahorse

Scoreboard:

In *Dallas Quest*: Don't accept JR's offer. Give the sunglasses to the owl. Never carry more than one object when going down the ladder.

In *Wishbringer*: The way to the Magick Shop is across the bridge. Don't let the seahorse die; put it back in the sea. He could save you later.

Luis Blando
Mendoza, Argentina

Can't Pass Cannibals

Scoreboard:

In *Dallas Quest*, I can't get past the cannibals by the cave.

Domenick Doran
Coram, NY

Beach House Bafflement

Scoreboard:

In *Shenanigans*, I found the girl in the clover field, but I can't get back.

In *Black Sanctum*, to build an altar, be sure to pull the nails and get the boards from the room near the bookcase. When in the room with the casket, type `OPEN COFFIN`. When someone calls your name, be sure to listen.

In *Calixto Island*, go up the hill and take the rug with you to trade with Trader Jack for a machete.

In *Sea Quest*, make sure you dig inside the cave after you move the boulder. To get to the beach house, type `GO FALLS` and follow the directions. Where is the key to open the door in the beach house.

Russ Maede
Fairbury, IL

Combo, Combo, Who Knows the Combo?

Scoreboard:

I am stumped by the safe in *Vortex Factor*. What is the combination? When you use the right combination, how do you open the safe?

Scott Garling
Norman, OK

Battery Operated

Scoreboard:

Does anyone know if the food serves any purpose in *Raaku-Tu*?

In *Sands of Egypt*, where are the dates to feed to the camel?

In *Pyramid*, I can get the batteries but I can't figure out how to put them into the lamp.

Neil Johnson
Walnut Creek, CA

Galaxy Guidelines

Scoreboard:

Some hints for *Hitchhiker's Guide to the Galaxy*: First, keep all the objects that you see. Typing `VERBOS` causes the computer to give you a full description of a room when you enter it. The Nutrimat eventually spews out your tea, but *do not drink it*! Type `GET TEA` and `GET NO TEA`.

How do you inflate the Thing so that it doesn't fall through the catwalk?

In *Vortex Factor*, how do I get to Cairo Moon? I can't read the hieroglyphics on the ring, and I don't have any idea what to do with the Mutant.

David Hill
Alberta, Canada

Plotter Plea

Scoreboard:

I need help getting the plotter in *Hitchhiker's Guide to the Galaxy*.

Dale Kaczmarek
Oaklawn, IL

Un-Pharaoh Advantage

Scoreboard:

I can't seen to get past the bottomless pit or the serpent in the Pharaoh's chamber in *Pyramid*.

Tom Gray
Tucson, AR

Pointed Predicament

Scoreboard:

How do you score points on *Madness and the Minotaur*?

Allen Bruce
Brodhead, WI

Same Time, Same Place

Scoreboard:

I am having a problem solving Level 2 of *Dragon Slayer*. I keep getting stuck at the same place every time.

Bruce Girard
Laguna Niguel, CA

Sure Shootin'

Scoreboard:

Some hints for *Gantelet*: Play the Elf. He is the only player who shoots diagonally. Try shooting targets that are far away, and be sure to master Level 7. Save your potions for the Death.

Rory Kostman
Hershey, NE

Southern Discomfort

Scoreboard:

At the pyramid in *Sands of Egypt*, oil the scepter and take it back to the pool. When at the pool, type `HOOK SCEPTER`, then `PULL SCEPTER` to drain the pool.

In *Pyramid 2000*, to kill the snake, throw the bird statue at it and be sure you have the scepter.

In *Dallas Quest*, to get the monkey to take the mask off the head hunter chief, show the monkey the mirror or give it to him.

In *Madness and the Minotaur*, beware of going south, because it is the only direction that leads to the dreaded maze.

In *Raaku-Tu*, after you find the secret passage behind the altar, then what do you do?

In *Madness and the Minotaur*, where are the spells? How do you escape the maze?

Steve Moore
Ontario, CA

Boulder-dash

Scoreboard:

In *Dragon Blade*, after I throw the boulder down the corridor and go through the tunnel, I fall into a shaft because it's too dark.

Harry Keener
Knoxville, TN

Moon Mobility

Scoreboard:

To get past Cairo Moon 2 in *Vortex Factor*, get the bird. Then go into the dungeon, search the skeleton and get the string. To get out, `CUT BARS` using the hacksaw.

In *Raaku-Tu*, how do you get past the rug?

Pat Cameron
Shippewa Falls, WI

* * *

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

— Jody Doyle

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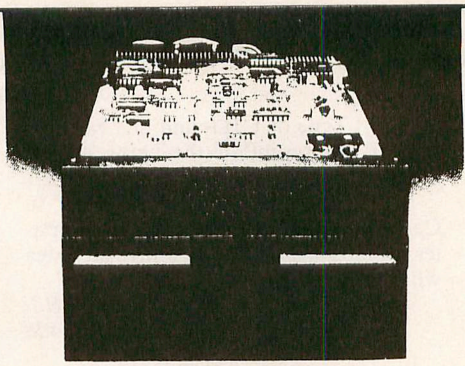

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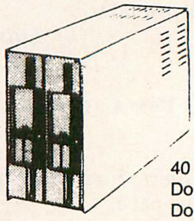

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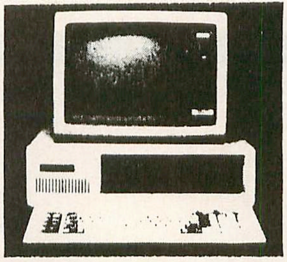

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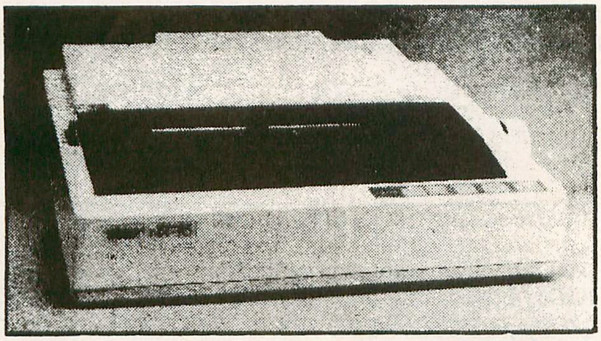

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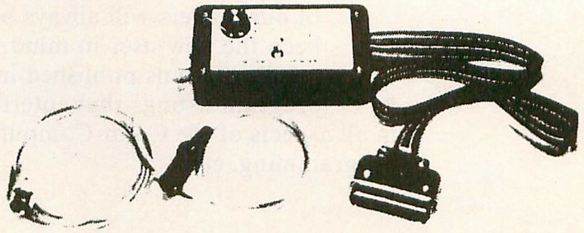

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A Midsummer's Light Theme

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Games

16K
ECB

Beat The Dealer

By Bill Bernico and George Aftamonow

The following program is a Lo-Res text screen version of the ever popular card game, blackjack. The object is to beat the dealer's hand by getting as close to 21 points as possible without going over.

After the cards are dealt, you will be given the opportunity to take additional cards. If you feel your hand is good enough, answer no to the prompt. The computer will then deal itself a hand, trying to beat yours.

You start the game with $100 and can bet any or all of it at a time. The game ends when the money is gone.

The listing: BLAKJACK

```
 10 'BLAKJACK by Bill Bernico and
                 George Aftamonow
 20 BA=100
 30 CLS3:FORX=1056TO1472STEP32:PO
KEX,191:NEXT:PRINT@0,STRING$(32,
191);:FORX=1087TO1535STEP32:POKE
X,191:NEXT:PRINT@480,STRING$(31,
191);:T=0:CA=1:PRINT@43,"CASH:";
BA;:PRINT@75,"";:PLAY"O4T60B":IN
PUT"BET:";BE:PL=1:PRINT@85,STRIN
G$(10,175);:POKE1119,191
40 IF BE>BA THEN 30
50 IFCA=1THENP=354ELSEIFCA=2THEN
P=359ELSEIFCA=3THENP=364ELSEIFCA
=4THENP=369ELSEIFCA=5THENP=374EL
SEIFCA=6THENP=379
60 GOTO90
70 IFCA=1THENP=129ELSEIFCA=2THEN
P=134ELSEIFCA=3THENP=139ELSEIFCA
=4THENP=144ELSEIFCA=5THENP=149EL
SEIFCA=6THENP=154
80 P=P+1
90 X=RND(13)+49:IFX=58THENX=10EL
SEIFX=59THENX=74ELSEIFX=60THENX=
75ELSEIFX=61THENX=81ELSEIFX=62TH
ENX=65
100 E=RND(2):IFE=1THENE$=CHR$(12
8)ELSEIFE=2THENE$=CHR$(191)
110 PRINT@P+32," "+E$+" ";:IFX=1
0THENPRINT@P,"10 ";:PLAY"O5T60B"
```

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- * Send full 128 character set from Keyboard with control codes.
- * Complete Editor, Insert, Delete, Change or Add to Buffer.
- * 9 Variable length, Programmable Macro Key buffers.
- * Programmable Printer rates from 110 to 9600 Baud.
- * Send Files directly from the Buffer, Macro Key Buffers or Disk.
- * Display on Screen or Print the contents of the Buffer.
- * Freeze Display & Review information On line with no loss of data.
- * Built in Command Menu (Help) Display.
- * And much, much more.

Supports: Word-Pak I, II, R.S. and Double Density 80 Column Cards
Disto Controller w/80 column card & parallel printer
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R. S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

Requires 32K & Disk, Only $59.95

HI-RES II Screen Commander

Tired of looking at the 16 line by 32 character display on your CoCo? Wish you could see more lines and characters? Then HI-RES II is the answer, it can give you the big screen display you've always wanted. It will display 24 lines of 32, 42, 51, 64 and even 85 true upper and lower case characters per line without extra hardware.

HI-RES II is the most powerful screen enhancement package available for the Color Computer, yet it is the least expensive. It is completely compatible and transparent to Basic. Once the program is loaded, everything works the same as before, only you have a much better display to work with. It even allows you to have mixed text and Hi-resolution graphics on the same screen or have separate text and graphics screens. It also has an adjustable automatic key repeat feature and allows you to protect up to 23 lines on the screen.

HI-RES II features over 30 special control code functions that allow you to change characters per line, protect display lines, change background color, position cursor, switch normal/reverse video, underline, double size characters, erase line/screen/to end of screen, home cursor, character highlight and much more. It works on all models of the CoCo with 16, 32 or 64K and provides automatic reset control so HI-RES II won't disappear when you press reset.

Only 24.95 on Tape or $29.95 on Disk

"The Source"

Now you can easily Disassemble Color Computer machine language programs directly from disk and generate beautiful, Assembler Source Code. And "The Source" has all the features and functions you are looking for in a Disassembler.

- * Automatic Label generation and allows specifying FCB, FCC and FDB areas.
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- * Menu display with single key commands for smooth, Easy operation.
- * Written in fast machine language, one of the easiest to use Disassemblers

Requires 32K Disk $34.95

TEXTPRO III
"The Advanced Word Processing System"

- * 9 Hi-Res Displays from 28 to 255 columns by 24 lines & Upper/Lower Case
- * Three Programmable Header lines that can be re-defined at anytime.
- * Programmable Footer line & Automatic Footnote System.
- * 10 Programmable Tab stops & 7 Powerfull Tab Function Commands.
- * Completely Automatic Justification, Centering, Flush left and right.
- * On screen display of underline and Double size characters.
- * Change indents, margins, line length, etc. parameters anytime in the text.
- * Create and Edit files larger than memory, up to the size of a full disk.
- * Easily imbed any number of format and control codes.
- * Automatic Memory sense 16-64K with up to 48K of memory workspace.
- * Fully supports the use of 80 column hardware cards.

TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO III is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

DISK $59.95 TAPE $49.95

The CBASIC Editor/Compiler V1.1.2

Do you want to write fast machine language programs but you don't want to spend the next few years trying to learn how ???
Well with CBASIC, you could be writing them right now!

CBASIC is the only fully integrated Basic Compiler and program editing system available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your color computer without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Extended Disk Color Basic, into fast efficient machine language programs easily and quickly. We added advanced features like a full blown program editor, Hi-Res text Displays and 80 column hardware support for editing, compiling and your compiled programs. Plus we made it exceptionally easy to use, CBASIC is the friendliest and easiest compiler available for the Color Computer.

"The most complete Editor/Compiler I have seen for the CoCo... "
--The RAINBOW, March 1986

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocation and so on, because CBASIC will do it for you automatically. Or, CBASIC will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC features well over 100 compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, including Graphics GET, PUT, PLAY and DRAW, all with 99.9% syntax compatibility. CBASIC also supports the built in Serial I/O port with separate printer & serial I/O baud rates. You can send and receive data with PRINT, INPUT and INKEY commands.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing and editing Basic programs. It has block move & copy, program renumbering, automatic line numbers, screen editing, printer control and more.

"The Editor is a very good one and could be the subject for review all by itself..." *--The RAINBOW, March 1986*

"Comparing ECB's edit mode to CBASIC's text editor is like comparing a World War II jeep to a modern sedan. Both get you to your destination, but what a difference in the ride. *-- Hot CoCo, Feburary 1986*

The documentation for CBASIC is an 8 1/2 * 11 Spiral Bound book which contains approximatly 120 pages of real information.

"CBASIC's manual is easy to read and written with a minimum of technicalese. " *--Hot CoCo February, 1986*

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any Color Basic compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk, not JDOS compatible.

"The price tag it carries seemed a bit steep for an integer compiler on first glance, but when you add 64K, hi-res drivers, and full-screen editing, CBASIC begins to look more like a bargain.." *-- Hot CoCo February, 1986*

"A Complete Editor/Compiler Well Worth its Price" --RAINBOW March 1986

EDT/ASM 64D
64K DISK EDITOR ASSEMBLER

EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily and it supports Column cards. The disk also contains a free standing ML Debug Monitor, to help you debug your assembled programs.

This is the most powerfull, easy to use Text Editor available in any Editor/ Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material.

- * Local and Global string search and/or replace.
- * Full screen line editing with immediate line update.
- * Easy to use Single keystroke editing commands.
- * Load &Save standard ASCII formatted Tape/Disk files.
- * Move or Copy single & multiple text lines.
- * Create and Edit disk files larger than memory.
- * Hi-Res Text Display 28 to 85 columns by 24 lines.
- * Supports Word-Pak I ,II. & R.S. and Disto 80 column display cards.

The Assembler portion of EDT/ASM 64D features include:

- * Supports the full 6809 instruction set.
- * Supports conditional IF/THEN/ELSE assembly.
- * Supports Disk Library files (include).
- * Supports standard motorola assembler directives
- * Allows multiple values for FDB & FCB directives.
- * Generates listings to Hi-Res text screen or printer.
- * Assembles directly to disk or tape in LOADM format.
- * Supports up to 9 open disk files during assembly.
- * Allows assembly from editor buffer, Disk or both.

The freestanding DEBUG program provided includes:

- * Examine and change the contents of memory.
- * Set, Remove and display up to 10 breakpoints in memory.
- * Display/Change processor register contents.
- * Move a Block of memory or Fill Memory range with specified data.
- * Search memory range for data pattern.
- * Disassemble memory range into op-code format.

Requires 32K Disk $59.95

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(Monday thru Saturday, 8am to 5pm PST).

CER-COMP
5566 Ricochet Avenue
Las Vegas, Nevada 89110
702-452-0632

```
:PRINT@P+64," 10";:FORU=1TO350:N
EXT:R=10:GOTO150
120 PRINT@P,CHR$(X)"  ";:PRINT@P
+64,"  ";CHR$(X);:PLAY"O5T60B":F
ORU=1TO350:NEXT
130 R=X-48:IFR=17THENIFR+T>27THE
NR=1ELSER=11
140 IFR>25THENR=10
150 CA=CA+1:T=T+R:IFCA=2AND PL=1
THEN50
160 IFT>21 AND PL=1 THEN270
170 IFT>21 AND PL=2 THEN260
180 IFPL=1THEN210
190 IFCA<3THEN70
200 PL(2)=T:IFPL(2)<PL(1) ANDCA<
6THEN70ELSE250
210 PRINT@258,"CARD TOTAL";T;:PO
KE1295,96:EXEC43345:PRINT@290,"A
NOTHER CARD ?";:FORF=1314TO1327:
POKEF,PEEK(F)-64:NEXT:ELSEPL(1)=
T:GOTO240
220 I$=INKEY$:IFI$=""THEN220
230 IFI$="Y"THEN50ELSEIFI$="N"TH
ENPL(1)=T ELSE220
240 PL=2:CA=1:T=0:GOTO70
250 IF(PL(2)=PL(1)OR PL(2)>PL(1)
)THEN270ELSE260
260 PRINT@277,"YOU WON";:PLAY"O3
FGFGFG":BA=BA+BE:PRINT@309,"any
key";:POKE1336,32:EXEC44539:GOTO
30
270 PRINT@274,"COMPUTER WON";:BA
=BA-BE:PRINT@306,"hit any key";:
POKE1333,32:POKE1337,32:POKE1341
,32:PLAY"O2ABABAB":EXEC44539:IFB
A<1THEN280ELSE30
280 PRINT@258,"YOU'RE BROKE ";:P
RINT@274,STRING$(12,175);:PRINT@
306,STRING$(12,175);:PRINT@290,"
ANOTHER GAME ?";:PLAY"O5BAGFEDCO
4BAGFEDCO3BAGFEDCO2BAGFEDCO1BAGF
EDC
290 I$=INKEY$:IFI$="Y"THENRUNELS
EIFI$="N"THENCLS:ENDELSE290
```

16K
ECB

Start Your Engines

By David Jolley

With summer's warmth and sun come an array of outdoor extravaganzas — picnics, fairs and sporting events. Catch the excitement of this last example with *Speedster*, an Indianapolis 500-type race car game.

You take control of a high-speed race car and must stay on the dangerously winding road as long as possible. A crash ends the game and displays the total score on the screen.

The listing: SPEEDSTR

```
10 A$=STRING$(20,32)
20 B$=CHR$(128)
30 C$=CHR$(191)
40 A$=A$+B$+LEFT$(A$,10)+B$+A$
50 L=10
60 FORY=1TO16
70 PRINTMID$(A$,L,32);
80 NEXT
90 PRINT@240,C$;
100 FORY=1TO3
110 SOUND1,1
120 FORT=1TO400
130 NEXT
140 NEXT
150 SOUND100,3
160 C=240
170 R=RND(2)
180 ON R GOTO 190,230
190 L=L+1
200 D=1
210 IF L>21 THEN L=21
220 GOTO260
230 L=L-1
240 D=0
250 IF L<1 THEN L=1
260 FORQ=1TO2
270 I$=INKEY$
280 IF I$=CHR$(8) THEN C=C-1
290 IF I$=CHR$(9) THEN C=C+1
300 NEXT
310 W=W+1
320 PRINT@C,CHR$(191);
330 E=PEEK(C+32+1024)
340 IF E<>96 THEN 400
350 PRINT@480,MID$(A$,L,32);
360 R=RND(10)
370 IF R>7 THEN 170
380 IF D=1 THEN 190
390 GOTO230
400 FORY=1TO1000
410 NEXT
420 PRINT"YOU CRASHED!"
430 PRINT"SCORE";W*10
```

COCO-3 ONLY PRODUCTS

TEXTPRO III-3

"The Advanced Word Processing System"

- 8 Displays from 32/40/64/80 columns by 24 lines 192 or 225 Resolution.
- Three Programmable Header lines that can be re-defined at anytime.
- Programmable Footer line & Automatic Footnote System.
- 10 Programmable Tab stops & 7 Powerfull Tab Function Commands.
- Completely Automatic Justification, Centering, Flush left and right.
- On screen display of underline and Double size characters.
- Change indents, margins, line length, etc. parameters anytime in the text.
- Create and Edit files larger than memory, up to the size of a full disk (156K).
- Easily imbed any number of format and control codes.
- Built in Ultra Fast 2 drive RAMDISK for 512K support.

TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO III is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

Requires 128/512K & DISK $59.95

EDT/ASM III

128/512K DISK EDITOR ASSEMBLER

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is similar to our EDT/ASM 64D for the COCO 1 & 2 but designed to take advantage of the new features of the COCO 3. It has 8 Display formats from 32/40/64/80 columns by 24 lines in 192 or 225 Resolution, so you can use the best display mode whether you are using an RGB or Composite monitor or even a TV for your display. Plus you can select any foreground and backbround colors or even color or monochrome display modes. It even supports 512K by adding an automatic 2 drive Ultra Fast RAMDISK for lightning fast assembly of program source code larger than memory. The disk also contains a free standing ML Debug Monitor, to help you debug your assembled programs. See our other Advertisement for information on some of the advanced features supported in the Editor, Assembler and Debugger.

Requires 128/512K & Disk $59.95

512K RAM UPGRADE

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Give your COCO 3 all the power it deserves with this easy to install (no soldering/plug in) 100% Tandy compatible 512K memory upgrade. Completely assembled and tested (in a COCO-3), not like some upgrades that give you a bare board and a set of ram chips to assemble & test yourself. (upgrade without RAM $49.95)

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Ultra Hi-Speed 512K RAMDISK and MEMORY Tester

RAMDISK is an ALL Machine Language program that will give you 2 ULTRA High Speed Ram Disks in your 512K COCO III. It does not need or require the OS-9 operating system. It works with R.S. DOS V1.0 or V1.1 and it is completely compatible with Enhanced Color Disk Basic!!! Plus it allows your 512K COCO-3 to run at double speed all the time even for floppy disk access!!! The MEMORY tester is a fast Machine Language program to test the 512K COCO-3. It performs several bit tests as well as an address test so you know that your 512K of memory is working perfectly.

Requires 512K & DISK $19.95

COMING SOON

Maybe even by the time you read this!!!

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CBASIC3 - With Enhanced Graphics & 512K RAM support plus more!

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- Programmable Word Length, Parity, Stop Bits and baud rates 300 to 9600.
- Complete Full and Half Duplex operation, with no garbled data.
- Send full 128 character set from Keyboard with control codes.
- Complete Editor, Insert, Delete, Change or Add to Buffer.
- 9 Variable length, Programmable Macro Key buffers.
- Programmable Printer rates from 110 to 9600 Baud.
- Send Files directly from the Buffer, Macro Key Buffers or Disk.
- Display on Screen or Print the contents of the Buffer.
- Freeze Display & Review information On line with no loss of data.
- Built in Command Menu (Help) Display.
- Built in 2 Drive RAMDISK for 512K RAM support and much more.

Supports: R.S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

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HI RES III Screen Commander

Now you can have up to 54 different character sizes on your COCO-3 screen at the same time!!!

- 54 Different Character Sizes available 14 to 212 cpl.
- **Bold**, *Italic* or Plain character styles.
- Double Width, Double Height and Quad Width characters.
- Full 96 Upper/Lower case characters.
- Continious or Individual Character Highlighting.
- Scroll Protect from 1 to 23 lines on the screen.
- Mixed Text & Graphics in HSCREEN3 mode.
- PRINT @ available in all character sizes.
- Programmable Automatic Key repeat.
- Full Control Code Keyboard supported.
- Full Cursor Control command support.
- Selectable Character & Background color.
- Color or Monochrome Display modes.
- Uses only 4K of Extended or Basic ram.
- Written in Ultra Fast Machine Language.

HI-RES III was designed to improve the standard display capabilities of the Color Computer 3, even the 40 and 80 column displays have several features missing. For example you can't use PRINT @ or have different character sizes on the same screen, even mixing text and graphics with the HPRINT command leaves a lot to be desired. HI-RES III can give you the kind of display capabilities you always dreamed about having on your color computer but didn't get with your COCO-3. Well now it's here and with a wide variety of display options that you can easily use with your Basic or ML programs. HI-RES III is totally compatible with Enhanced Color Basic and its operation is invisible to Basic. It simply replaces the normal screen display with an extremely versatile display package. It also overcomes some of the disadvantages found when using the Width 40 & 80 screens. You can use the Print @ function on any line length with HI-RES III. It also gives you a programmable automatic key repeat that can be very handy for editing your Basic programs. Automatic key repeat can be adjusted from ultra fast to super slow and can be disabled entirely if desired. You also get a full control code keyboard using the 'CTRL' key. So many of HI-RES III's extended functions can be controlled directly from the keyboard easily. With just a couple of simple keystrokes you can change character sizes and styles at any time. You can even switch back and forth between the standard COCO-3 display and HI-RES III with a simple keyboard entry or under program control. But, after you use HI-RES III, you most likely won't want to do without it again.

HI-RES III can be used for a wide variety of applications, with its many different character sizes and styles. You can make your program really look professional, with protected menus, Bold or Italic emphasis, Double or Quad characters for easy to read displays & menus. It can be idealy suited for Video Titles or Store Displays. Printing Signs or Fliers in conjunction with a Hi-res Screen dump program. The visually impared will espically appreciate the extra large character sizes available.

Requires 128/512K Tape or Disk $34.95

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16K
ECB

Theater Management

By Paul Flaishaker

Can you solve this puzzling problem? You may need to develop your own calculation program in order to do so!

The listing: THEATRE

```
5 REM THEATRE
6 REM WRITTEN BY PAUL FLAISHAKER
7 REM 1021 E. WILLIAMS DR.,
8 REM PALATINE,IL. 60067.
10 PRINT"CAN YOU SOLVE THIS PROB
LEM"
20 PRINT"THIS THEATRE IN TOWN HA
S 100    SEATS AVAILABLE"
30 PRINT"THE MOST THAT MANAGEMEN
T CAN    MAKE IS $1.00 FOR ALL T
HE SEATS SOLD"
40 PRINT"THE MANAGER FIGURED HE
WOULD    CHARGE ONE CENT"
50 PRINT"FOR EVERY TEN CHILDREN
SEATED."
80 PRINT"TWO CENTS FOR EVERY WOM
AN SEATED";:
90 PRINT" AND FIVE CENTS FOR EVE
RY MAN   SEATED. REMEMBER ALL SE
ATS MUST BE FILLED."
100 PRINT
110 PRINT"  HIT ANY KEY TO CONTI
NUE."
115 A$=INKEY$:IF A$="" THEN GOTO
 115
120 CLS:INPUT"HOW MANY CHILDREN
WERE SEATED.";C
140 INPUT"HOW MANY WOMEN WERE SE
ATED.";W
150 INPUT"HOW MANY MEN WERE SEAT
ED.";M
160 CLS
165 PRINT@43,"SEATS       ENTRAN
CE"
170 PRINT@76,"SOLD         FEE."
175 PRINT
180 PRINT@130,"CHILDREN";:PRINT@
140,C
190 F=C/1000:PRINT@152,F
200 PRINT@162,"WOMEN";:PRINT@173
,USING"##";W
210 G=W/50:PRINT@184,USING"#.##"
;G
225 PRINT@194,"MEN";:PRINT@205,U
SING"##";M
230 H=M/20:PRINT@216,USING"#.##"
;H
240 PRINT@236,"----";:PRINT@248,
"----";
250 PRINT@258,"TOTALS";
260 T=C+W+M:TT=F+G+H
262 IF T=<99 THEN PRINT@268,T
270 IF T=>99 THEN PRINT@267,T
280 PRINT@278,USING"$ #.##";TT
290 IF T=(100) AND TT=(1) THEN P
RINT@326,"THAT'S A NICE!!.
            YOU DID IT";:PRINT@3
90,"I HATE A SMARTY!!";:END
300 PRINT@300,"WRONG
      WANT TO TRY AGAIN?(Y/N)";
310 A$=INKEY$:IF A$=""THEN 310 E
LSE IF A$="N"THEN END ELSE IF A$
="Y"THEN GOTO 120
```

4K

Making Magic

By John Morrison

When magicians take the stage, eyes fill with awe as unlikelihoods become realities, over and over again. Now you can play with a magic puzzle that has intrigued mathematicians and magicians alike for centuries — the magic square.

This program, *Magic Square*, produces a 16-block square. When a number between 35 and 70 is entered, a square of different numbers (four columns and four rows) is displayed. The sum of these numbers (added vertically, horizontally and diagonally) is the original number you entered. Additionally, the four corner numbers add up to your original number.

Since magicians do not disclose how their tricks work, the secret to how this program accomplishes its magical display is not revealed. However, since you will be entering the program into the CoCo, you will be, in effect, behind the scene and can figure out the magic of how the program works. Remember: A good magician never gives away the secret.

The listing: MAGICSQR

```
1 '**MAGSQR**
2 '**BY MORRISON-MAGICIAN**
3 '** 1024 SECOND STREET **
4 '** BEAVER, PA. 15009   **
```

```
5 '** (C) JAN. 20, 1966  **
10 CLS
20 PRINT@34,"ENTER A NUMBER FROM
 35 TO 70"
30 INPUT A
40 CLS
50 PRINT@78,A
60 PRINT@100,"HERE IS YOUR MAGIC
 SQUARE"
70 PRINT@170," 1   10   "A-19"
8"
80 PRINT@232," "A-18"   7    2
 9"
90 PRINT@299,"6   " A-21"  12
3"
100 PRINT@361,11"   4    5   "A-2
0
110 GOSUB400
120 PRINT@160,"HORIZONTAL 1    10
 "A-19"  8"
130 GOSUB440
140 PRINT@160,"HORIZONTAL 1 + 10
 "A-19"   8"
150 GOSUB 440
160 PRINT@160,"HORIZONTAL 1 + 10
 +"A-19"   8"
170 GOSUB 440
180 PRINT@160,"HORIZONTAL 1 + 10
 +"A-19" + 8"
190 GOSUB 440
200 PRINT@160,"HORIZONTAL 1 + 10
 +"A-19" + 8 ="A
210 GOSUB 480
220 PRINT@232," "A-18"+  7 +  2
 + 9 ="A""
230 GOSUB 480
240 PRINT@299,"6 +"A-21"+ 12  +
3 ="A""
250 GOSUB 480
260 PRINT@361," 11 +  4 +  5 +"A
-20"="A""
270 GOSUB 440
280 PRINT@394,"--   --   --   --
"
290 GOSUB 440
300 PRINT@416,"VERTICAL "A" "A"
"A" "A""
310 GOSUB 440
320 PRINT@449,""A" <<<<<< DIAGON
ALS >>>>>>"A""
330 GOSUB 440
340 PRINT@224,"FOUR"
350 PRINT@256,"CORNERS    6 +"A-
21"+ 12  + 3 ="A""
360 PRINT@288,"EQUAL"A"
370 GOSUB 440
380 PRINT@480,"FOUR NUMBERS AT C
ENTER EQUAL "A""
390 GOTO 390
400 S=5
410 FOR Z=1 TO 460*S
420 NEXT Z
430 RETURN
440 X=1
450 FOR Y=1 TO 460*X
460 NEXT Y
470 RETURN
480 X=2
490 FOR Y=1 TO 460*X
500 NEXT Y
510 RETURN
```

Word Fun

Have A Hand At Hangman

4K

By Shawn Stewart

The following program is a simple version of the popular Hangman game. The object is to guess random words in six tries.

If the letter you choose is in the word, the computer shows you its position in the word. Play continues until you guess all the letters or make six mistakes.

If you want to add your own words, change the DATA statements in lines 600 and 610 or add more lines. Afterward, count the number of words and make the change in Line 10. (The last number in the parentheses should become the number of words in your DATA statements.)

The listing: HANGMAN

```
1 RESTORE
5 CLS
10 FOR I=1TORND(10)
20 READ W$
30 NEXT I
40 PRINT "O.K. I'M THINKING OF A
 WORD."
50 PRINT:F=1
60 FOR I=1TOLEN(W$)
70 D$=D$+"?"
80 NEXT I
90 PRINT D$
100 PRINT "YOU HAVE";M;"MISTAKES
."
110 INPUT"LETTER";L$
120 REM
```

```
200 REM PRINT CURRENT WORD STATU
S
210 FOR I=1TOLEN(W$)
220 IF MID$(W$,I,1)<>L$ THEN 240
230 D$=LEFT$(D$,I-1)+L$+RIGHT$(D
$,LEN(D$)-I):F=0
240 NEXT I
250 IF D$=W$ THEN 400
260 M=M+F:F=1
270 IF M=6 THEN 500
300 GOTO 90
310 REM
400 PRINT:PRINT"YOU GOT IT!!"
410 FOR X=1TO2100
420 NEXT X
430 GOTO 1000
500 PRINT "YOU HAVE TOO MANY MIS
TAKES."
510 PRINT:PRINT "THE WORD WAS ";
W$;"."
520 FOR X=1TO2100
525 NEXT X
530 GOTO 1000
550 REM**************************
555 REM*****DATA STATEMENTS*****
560 REM**************************
600 DATA THE,RAINBOW,IS,THE,BEST
610 DATA MAGAZINE,FOR,YOUR,COLOR
,COMPUTER
1000 CLS:PRINT"THANK YOU FOR PLA
YING"
```

4K

Scrambled Screen Of Letters

By Neil Johnson

Scrambled letters fill the screen. A timer, set at 90 seconds, begins its countdown. You must find and write down as many words as possible before the timer beeps at zero.

You can use any combination of letters going in any direction (up, down, right, left, diagonal, forward or backward) as long as the letters are adjacent. As an example, you can form a word by going up two letters, diagonally three letters, and then left two letters.

Grab a piece of paper and a bunch of friends, have a seat in front of your CoCo, and give this program a try!

The listing: `WORD1`

```
10 REM**WORD SEARCH**
20 REM**BY NEIL JOHNSON**
30 REM**APRIL 17, 1987**
40 CLS
50 CLEAR 250
60 C=0
70 PRINT @ 195, "PREPARING SCRAM
BLE"
80 FOR I=1 TO 10
90 A$(I)=""
100 FOR K=1 TO 20
110 A$(I)=A$(I)+CHR$(RND(26)+96)
120 NEXT K
130 NEXT I
140 PRINT @ 1, "WORD SEARCH"
150 PRINT @ 417, "FIND AS MANY W
ORDS AS YOU CAN"
160 PRINT @ 449, "IN THE SCRAMBL
E IN 90 SECONDS."
170 PRINT @ 122, "TIME"
180 PRINT @ 154, "LEFT"
190 PRINT @ 187, "90"
200 PRINT @ 195, "PUSH ENTER TO
START"
210 AN$=INKEY$
220 IF AN$="" THEN GOTO 210
230 FOR I=67 TO 355 STEP 32
240 C=C+1
250 PRINT @ I, A$(C);
260 NEXT I
270 FOR I=89 TO 0 STEP -1
280 FOR K=1 TO 691
290 NEXT K
300 PRINT @ 186, I
310 NEXT I
320 SOUND 185,7
330 PRINT @ 417,"TIME'S UP!
      "
340 PRINT @ 449,"PRESS ANY KEY T
O BEGIN AGAIN. "
350 AN$=INKEY$
360 IF AN$="" THEN GOTO 350 ELSE
 RUN
```

Utilities

4K

Help For Adventurers

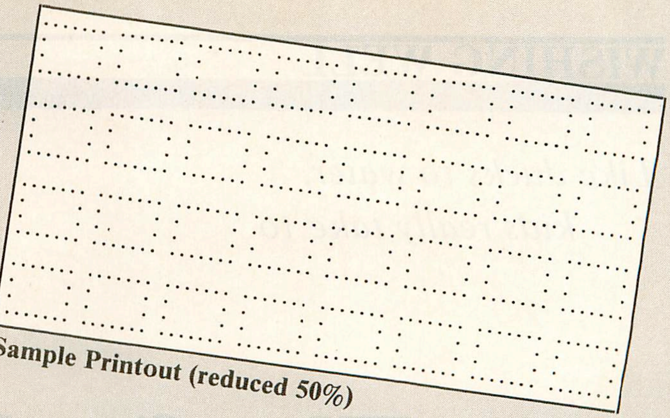
By Neil Haupt

Mapper is a timesaver for Adventure enthusiasts. The program draws blank Adventure maps on an 80-column printer. Then, you can fill in the allowed moves and put room descriptions into the boxed areas. This makes the map much more readable.

The Adventurer's job of mapping just became quite a bit easier!

The listing: MAPPER

```
1 'ADVENTURE MAP PRINTER
   BY NEIL HAUPT
2 CLS4:FORD=1TO300:NEXT:CLS7:POK
E1072,13:FORD=1TO300:NEXT:POKE11
36,1:FORD=1TO300:NEXT:POKE1200,1
6:FORD=1TO300:NEXT:POKE1264,16:F
ORD=1TO300:NEXT:POKE1328,5:FORD=
1TO300:NEXT:POKE1392,18:FORD=1TO
600:NEXT:SOUND200,1
3 CLS3:PRINT"NEED INSTRUCTIONS?
Y OR N"
4 A$=INKEY$:IFA$=""THEN4
5 IFA$="Y"THENGOSUB16
6 SOUND200,1:CLS3:PRINT"SET UP F
OR 1200 BAUD!":PRINT"IS YOUR PRI
NTER SET AT 1200 BAUD":PRINT"ENT
ER Y FOR 1200 BAUD, ANY KEY  FOR
 600 BAUD":INPUTBD$
7 IFBD$="Y"THENPOKE150,40ELSEPOK
E150,87
9 FORX=1TO12:GOSUB10:GOSUB12:GOS
UB12:GOSUB10:GOSUB14:NEXTX:END
10 PRINT#-2,"....... ....... ...
.... ....... ....... ....... ...
.... ....... ....... ......."
11 RETURN
12 PRINT#-2,".     . .     . .
   . .     . .     . .     . .
   . .     . .     . .     ."
13 RETURN
14 PRINT#-2,""
15 RETURN
16 SOUND200,1:CLS3:PRINT"THIS UT
ILITY PRINTS A BLANK MAP FOR USE
 IN SOLVING ADVENTURES.  SET A P
IECE OF PAPER AT THE TOP OF THE
PAGE AND TURN PRINTER ON HIT ANY
 KEY WHEN READY":EXEC44539:RETUR
N
```



Sample Printout (reduced 50%)

16K
ECB

Joy For Joysticks

By Richard S. Ellis

Do you ever wonder if your joystick is working properly? Lots of people do, and, unfortunately, they're either still wondering or they've gone out and bought a new one.

Joystick Check-Out does just what its name implies. The program provides information on the position of the left and right joysticks and firebuttons simultaneously. It also explains how joystick routines work.

Simply plug in your joysticks, run the program and read the data. Refer to Figure 1 to determine if the joysticks are working properly.

The program is short, but informative — perfect for inquisitive minds.

VALUE 65280	RIGHT	LEFT		
124	Closed	Closed	& Right Horizontal < 1	
125	Open	Closed	& Right Horizontal < 1	
126	Closed	Open	& Right Horizontal < 1	(Varies)
127	Open	Open	& Right Horizontal < 1	
252	Closed	Closed	& Right Horizontal > 1	
253	Open	Closed	& Right Horizontal > 1	
254	Closed	Open	& Right Horizontal > 1	(Varies)
255	Open	Open	& Right Horizontal > 1	

Note: Closed is the same as firing or pressing button
Open is the same as not firing

Value of the right joystick horizontal (left/right & 0/63) = JOYSTK(0)
Value of the right joystick vertical (up/down & 0/63) = JOYSTK(1)
Value of the left joystick horizontal (left/right & 0/63) = JOYSTK(2)
Value of the left joystick vertical (up/down & 0/63) = JOYSTK(3)

Figure 1: Joystick Details

The listing: JOYCHECK

```
1 'JOYSTICK CHECKER BY RS ELLIS
2 CLS:PRINT@40,"joystick";CHR$(1
28);"checker":PRINT@448,"   (H=H
ORIZONTAL  V=VERTICAL)"
3 U$="##":PRINT@226,"H    V"
4 PRINT@130,USINGU$;JOYSTK(0);:P
RINT@135,USINGU$;JOYSTK(1);:PRIN
T"   right";:X=PEEK(65280):IFX=1
24ORX=126ORX=252ORX=254THENPRINT
" SWITCH closed"ELSEPRINT" SWITC
H OPEN"
5 PRINT@322,USINGU$;JOYSTK(2);:P
RINT@327,USINGU$;JOYSTK(3);:PRIN
T"   left ";:IFX=124ORX=125ORX=2
52ORX=253THENPRINT" SWITCH close
d"ELSEPRINT" SWITCH OPEN"
6 GOTO4
```

Contributions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

— Jutta Kapfhammer
Submissions Editor

WISHING WELL

32K ECB

Like ducks to water,
kids really take to

The Spelling Game

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget that this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Last month I introduced a program titled CoCo Keys, which could be used to introduce youngsters to the workings of a computer keyboard. By now, most of you have typed in that program or loaded it from your RAINBOW ON TAPE or DISK. Since it is still too early to tell whether or not any of you liked the program, I can only hope that your reactions are similar to those of the people I let try the program prior to its publication. Their verdict was thumbs up!

That program, if you recall, was based on a suggestion from Sonya Hurst of Richmond, California. She was trying to design a keyboard program that could be used for spelling with her 5-year-old daughter. The program would work with Radio Shack's Speech/Sound Cartridge. As of this writing, I do not know if she succeeded in creating her own program. *CoCo Keys* was not exactly what she requested, but it was a start for the major working parts.

Therefore, this month, *CoCo Keys 2* will completely grant that wish by providing a spelling program with a graphics keyboard and speech thrown in as an added bonus. What is really nice about this program, however, is that it can also be used as a game without the Speech Pak as a way of reinforcing spelling skills with keyboard locations.

Putting the Finishing Touch

I really thought I had the system beat this time by getting the program written a few weeks ahead of schedule. Only a little work was needed to transform *CoCo Keys* to *CoCo Keys 2*. Most of the hard parts, such as the graphics keyboard, were already designed. What I did not expect was a major setback in another area.

To put it very simply, I am sitting in front of my computer hacking out this column with one hand because my left arm is in a sling. It seems that I accidentally ripped a muscle in my left shoulder: something called the rotator cuff. Talk about pain! The worst part about the injury was how I did it. I didn't do it while working out with my wrestlers, or while lifting weights, or even while out taking my daily run. I did it while vacuuming out the car! It seems that I stretched my left arm a little too far while trying to reach something under one of the seats.

Well, besides slowing me down a bit, it has made me a little more aware of keyboard locations while trying to do everything with just one hand. After all, that is what both of these *CoCo Keys* programs are about anyway. Call it poetic justice if you must. All I know is that I was lucky to get the program done before the injury took place. I only had to go through the inconvenience of writing the article this way.

However, that brings to mind what the real purpose of writing these programs is all about. Working with handicapped and special needs students helps keep you aware of what obstacles others must go through in their lives, while we take our health and fitness for granted. Just last week we had a group of handicapped students address our student body about the dangers of alcohol and drug abuse.

The students and young adults were from an outreach program called Operation Street Smarts from Lynn, Massachusetts. Some of the members of the group were wheelchair bound as a result of drug or alcohol use or alcohol-related accidents. One person was paralyzed from the waist down and only had limited use of one hand. These people are limited in their actions and abilities for the rest of their lives. Looking back at that week makes my minor injury seem totally insignificant. I suppose that minor accidents help us keep things in perspective.

One thing I have gotten from this experience is greater resolve to have even just one of my programs help overcome the handicaps of others.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

What suggestions do you have? Any ideas? Write and let me know of a need that our CoCo could help meet for a handicapped person. Later I'll tell you how this program now seems to be helping one such student: a 17-year-old named Chris.

The Program

Type in the listing exactly as you see it, including all commas found in the `DATA` statements. Failure to do this correctly will result in an OD Error. The `DATA` statements at the end of the program starting with Line 1000 and ending in Line 5000 are reserved for you to insert your own spelling or game words. I have included some simple words and their phonetic sound so the Speech Pak can pronounce them in a way the user can understand. You must remember to use two entries for each line: the correctly spelled word and the phonetic pronunciation.

Using the Program

This program can be used in two different ways: as a spelling program with speech or as a keyboard recognition game involving spelling words, without speech.

On running the program, you will see a solid-colored screen, either red or blue. If the screen is red, press ENTER to proceed. If the screen is blue, then press reset and run until the screen is red. This will help set up the graphics keyboard with the correct color pattern.

Talking Version

If you are using the Tandy Speech Pak, press T for talking when the title-card appears. (Be sure to plug in the Pak with the power off on your CoCo before loading the program.) The computer will repeat the spelling word twice, and then you must match the flashing keys on the screen to the correct keys on the keyboard. As a correct key is pressed, the letter will be spoken by the computer. Press the wrong key and the screen will flash.

As you press the correct keys, the word will be spelled out at the bottom of the screen. If at any time you want to check your score, hold down SHIFT while pressing the CLEAR key. You may continue by pressing C. The score card operates like all our other score cards from our other "Wishing Well" programs.

As you can tell by now, the program will actually spell out each word for you by flashing the corresponding key on the screen. It is not testing the user on the spelling. Instead, it is helping the user go through the steps of learning and reinforcement. It can be a big help in learning new words. (Note: The words must be 10 letters or less in length.)

Non-Talking

If you do not have a Speech Pak, you can use this same program in a slightly different way without making any other changes. Simply press N for non-talking; the program works in the same way without talking. However, this way the program becomes a game to see if the user can quickly match the flashing key to the keyboard and guess the spelling word. The teacher or parent can sit with the student to prompt him or her along. You could even use a stop-watch to time how quickly all the words are correctly spelled. (I didn't want to write that routine into the program because different CoCos, new and old, have different clock speeds sometimes. It wouldn't be as accurate.)

Believe me, students will even enjoy using the program in this way. It does not need speech to be a hit. The graphics alone will get it by.

Using Your Own Words

To use your own spelling words, dump mine by entering:

```
DEL1000-4999
```

Line 5000 must be:

```
DATA END,END
```

Keep your words under 10 letters in length. Use one word with its pronunciation per line. Separate each by a comma, such as:

```
1000 DATA DIRT,DURT
```

You may include up to 99 such words, but I wouldn't use that many. The program would take too long to run. Ten to 20 is usually a good number. Be sure to save your new version with a

Field Test

As soon as I completed this program, one of my fellow teachers suggested I let one of our students, Chris, try it with his spelling words. Chris still has difficulty with simple words such as "stop," "taxi," "if" and "the."

I put about 10 of these words in the CoCo and let him try. While being very limited in ability, he has taken to the program like a duck to water. He really enjoys using the program and, after only a few days, is able to guess the word after only a few letters. (Special needs students sometimes have a problem with closure: completing a word, sentence or picture if part is missing.) This program will now become part of his daily routine.

Conclusion

I hope you all can become more appreciative of those who have limited abilities. Helping them can be a big part of making your day. While this program didn't start out that way, the end result fit that picture perfectly. I hope some of you can come up with suggestions on helping others with handicaps by using our CoCo.

Until then, I'm going rest a bit and let my car get a little dirtier than usual. ☐

45	186	385	55
110	55	460	162
220	218	510	196
280	210	END	216
350	146		

The listing: `COCOKEY2`

```
0 PCLEAR8
1 REM ************************
2 REM *       CO CO KEYS        *
3 REM "    KEYBOARD SPELLER     *
4 REM *    A SPELLING GAME      *
5 REM *    BY FRED B.SCERBO     *
6 REM *     60 HARDING AVE.     *
7 REM * NORTH ADAMS,MA 01247 *
8 REM *   COPYRIGHT (C) 1987    *
9 REM ************************
10 PMODE4,1:PCLS1:SCREEN1,1:PMOD
E3:PCLS2
15 X$=INKEY$:IFX$<>CHR$(13)THEN1
```

```
5
20 CLS0:PRINTSTRING$(32,172);:FO
RI=1TO256:READA:IFA=0THENA=16
25 PRINTCHR$(A+112);:NEXT:PRINTS
TRING$(32,172);
30 DATA46,44,44,44,42,46,44,44,4
5,116,126,,,112,126,120,126,124,
124,124,122,122,,,112,122,117,12
4,124,124,124,125
35 DATA42,,,,,42,,,37,,122,,112,
118,,,122,,,,120,122,,,112,122,1
17,,,,,
40 DATA42,,,,34,42,,,37,,,122,112
,118,,,,122,,,,,122,,,112,122,11
7,,,,,
45 DATA44,44,44,44,40,44,44,44,4
4,,123,118,,,,,,123,115,115,119,,
121,112,,113,120,117,115,115,115
,115,115
50 DATA110,108,108,108,106,110,1
08,108,109,112,122,116,114,,,,12
2,,,116,112,,121,115,120,,,,,,,1
17
55 DATA106,,,,,106,,,101,,122,,1
16,114,,112,122,,,,,,,122,,,,,,,
,117
60 DATA106,,,,98,106,96,96,101,,
122,,,116,114,,122,,,112,114,,11
2,122,,,113,112,,,,117
65 DATA108,108,108,108,104,108,1
08,108,108,116,124,,,,116,120,12
4,124,124,124,120,,116,124,,,116
,124,124,124,124,124
70 PRINT@357,"  KEYBOARD SPELLIN
G  ";:PRINT@389," (T)ALKING OR
(N)OT ? ";
75 PRINT@421,"   BY FRED B.SCERB
O   ";
80 PRINT@453,"  COPYRIGHT (C) 19
87  ";
85 X$=INKEY$:IFX$="T"THEN105
90 IFX$="N"THEN100
95 GOTO85
100 NT=1
105 CLS0
110 XX=&HFF00:YY=&HFF7E
115 POKEXX+1,52:POKEXX+3,63
120 POKEXX+35,60
125 DIMR(23),L$(26),Y(40),A(26,2
),G$(26),K(100),L(100),SP$(100),
PR$(100):C$(1)="C1":C$(2)="C2":C
$(3)="C3":C$(4)="C4"
130 FORI=1TO26:READL$(I):NEXT
135 GOTO265
140 AA$=JK$
145 A$=STR$(A):B$=STR$(B)
150 DRAW"BM"+A$+","+B$+C$(CL)
155 IF LEN(JK$)<=24THEN175
160 FOR T=24TO0STEP-1:IF MID$(JK
```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry
(preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

Two-Liner Contest Winner . . .

As the computer "throws" numbers on the screen, wait until the numbers match and then press any key except BREAK. But, you'd better be fast.

The listing:

```
1 I$=INKEY$:CLS:R=RND(10):S=RND(
10):PRINT@238,R;S:IF INKEY$<>""T
HENGOTO2ELSEGOTO1
2 IF R=S THENPRINT"WINNER!!":T=T
+1:PRINT"SCORE:"T:FORY=1TO1000:N
EXTY:GOTO1ELSEPRINT"LOSER":FORX=
1TO1000:NEXTX:GOTO1
```

David Fye
Tucson, AZ

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

```
$,T,1)=" "THEN170
165 NEXT T:GOTO175
170 L$=LEFT$(JK$,T):W$=L$:GOSUB1
80:JK$=" "+RIGHT$(JK$,(LEN(JK$))
-T):GOTO145
175 W$=JK$:B=B+14:GOSUB180:RETUR
N
180 SL=LEN(W$):FORI=1TOSL:BB$=MI
D$(W$,I,1):C=ASC(BB$)-64:IF C=-3
2THEN DRAW"BR6":GOTO200
185 IF C=-18THENDRAW"BR2RBR9":GO
TO200
190 IFC=-20THENDRAW"BR2R2D2G2E4B
R7":GOTO200
195 DRAWL$(C)
200 NEXTI:B=B+14:RETURN
205 IFNT=1THENRETURN
210 FORII=1TOLEN(AA$)
215 IF PEEK(YY)AND 128=0 THEN215
220 POKEYY,ASC(MID$(AA$,II,1))
225 NEXTII
230 IFPEEK(YY)AND128=0THEN230
235 POKEYY,13
240 FORHH=1TO600:NEXTHH:RETURN
245 RETURN
250 DATA U6E2R2F2D2NL4D4BR6,U8R4
F2G2NL4F2G2NL4BR8,U8R6ND2BD8NU2N
L6BR6,U8R4F2D4G2NL4BR8,U8NR4D4NR
4D4R4BR6,U8NR4D4NR4D4BR10,U8R6BD
4NL2D4NL4BR6,U4NU4R6U4D8BR6
255 DATA R2U8L2R4L2D8R2BR2,NU4R4
U8L4R6BD8BR6,U8D4R2NE4F4BR6,NU8R
4BR6,U8F3ND2E3D8BR6,U8F6NU6D2BR6
,U8R6D8NL6BR6,U8R6D4L6D4BR12,U8R
6D8NL6NH4NF2BR6
260 DATA U8R6D4L4F4BR6,R6U4L6U4R
6BD8BR6,BR4U8L4R8BD8BR6,NU8R6NU8
BR6,BU8D4F4E4U4BD8BR6,NU8R4NU6R4
NU8BR6,E8G4H4F8BR6,BU8D2F4ND2E4U
2BD8BR6,NR8E8NL8BD8BR6
265 GOTO270
270 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3
275 LINE(0,0)-(256,92),PRESET,BF
280 DRAW"BM10,16":FORI=1TO13:GOS
UB495:PAINT(4+(I*18),12),3,3:NEX
T
285 DRAW"BM2,34":FORI=1TO14:GOSU
B495:PAINT((I*18)-6,28),3,3:NEXT
290 DRAW"BM4,52":FORI=1TO11:GOSU
B495:PAINT((I*18)-2,42),3,3:NEXT
:DRAW"C4U14R32D14NL32BR4":PAINT(
(I*18)-2,42),4,4:GOSUB495:PAINT(
242,42),3,3:PAINT(242,42),4,1
295 DRAW"BM4,70U14R28D14NL28BR4"
:FORI=1TO10:GOSUB495:PAINT((I*18
)+6,60),3,3:NEXT:DRAW"U14R28D14L
28":PAINT((I*18)+6,60),3,3:PAINT
(236,60),3,3:PAINT(236,60),4,1
300 PAINT(24,60),4,1:PAINT(10,32
),4,1:PAINT(10,48),4,1:PAINT(248
,32),4,1:PAINT(218,32),4,1
305 CL=1:A=6:FORF=1TO10:READJK$:
A=A+18:B=32:GOSUB145:NEXT
310 DATA Q,W,E,R,T,Y,U,I,O,P
315 A=8:FORF=1TO9:READJK$:A=A+18
:B=50:GOSUB145:NEXT
320 DATA A,S,D,F,G,H,J,K,L
325 A=22:FORF=1TO7:READJK$:A=A+1
8:B=68:GOSUB145:NEXT
330 DATA Z,X,C,V,B,N,M
335 COLOR1,4:LINE(60,74)-(196,88
),PRESET,BF
340 PAINT(236,6),2,1
345 PMODE4:DRAW"C0BM12,48NE3NH3U
8BU10BL2U8NF3G3"
350 PMODE4:DRAW"BM6,64C0":FORI=1
TO2:DRAW"R4U2L4U2R4BR2D4U2R4U2D4
BR4U4BR4ND4NR2D2NR2U2BR4R2ND4R2B
D4BR186":NEXT
355 DRAW"BM204,46C0NR4U2NR4U2R4B
R2ND4F4U4BR2R2ND4R2BR2NR4D2NR4D2
R4BR2U4R4D2L4R2F2BR10NR2U4R2BR4D
4NR2BU20NH2NG2L8BL10L8NE2NF2"
360 PMODE3:DRAW"C1BD7BL14L2H2U6E
2R4F2D4G2L2H2U4R2BG14BL2BDD2NR2N
```

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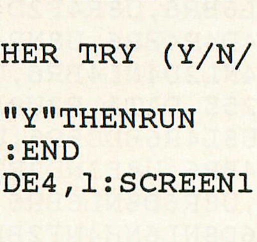
```
L2D2BD2DBD2DG2"
365 DRAW"BL19BD5G3F3BLBD2D2G2BR1
8BUU2BU3E3H3BR16R4D2L2D2BD2DBD5E
4
370 PMODE3:DRAW"BM18,15C1U5NGBU2
UBU2U2BR14ND2BR4D2BD4NL4D3L4D3R4
BR14R4U3NL2U3L4BU2U2NL2NR6U2NL2N
U2R6L2U2D6BR14R4U3L4U3R4L2NU2D8B
L3D4R8U4D6"
375 DRAW"BR12R4U3L4U3R4BU3NEBL4E
4BL4LBR18R3DG2DR4H4BD7NR4D6R4U4N
L4BU2BR14R6M-4,+6BU10U2BR20BUG2D
F2BD2BL2R4D3L4U3D6R4NU3BR14R4U3L
4U3R4ND3BU2BL2E2UH2BR14BD7D6NE4B
RR4U6NL4BR14BD2NRBD2NRBU8NE2NH2N
F2NG2NU2ND2BR16BDR4BU2L4BD8R4C4B
R14U6NL2R4D3NL4D3NL6BR4U6
380 REM
385 FORI=1TO26:READA(I,1),A(I,2)
:G$(I)=CHR$(I+64):NEXT
390 FORJ=1TO100:READSP$(J),PR$(J
):IFSP$(J)="END"THEN400
395 NEXTJ
400 J=J-1
405 PCOPY1TO5:PCOPY2TO6:PCOPY1TO
7:PCOPY2TO8
410 FORI=1TOJ
415 K(I)=RND(J):IFL(K(I))=1THEN4
15
420 L(K(I))=1:NEXTI
425 LINE(0,96)-(256,134),PRESET,
B:JK$=" PRESS THESE CHARACTERS
  ON YOUR KEYBOARD.":A=0:B=112:
CL=2:GOSUB140
430 AA$="PRESS THESE KARRECTERS
ON YOUR KEY BOARD. YOUR WORD IS"
:GOSUB205
435 COLOR1,4:PMODE4,1:SCREEN1,1:
PMODE3:FORY=1TOJ:AA$=PR$(K(Y)):C
OLOR1,4:LINE(0,150)-(256,192),PR
ESET,BF:GOSUB205:FORJK=1TO400:NE
XTJK:GOSUB205:A=4
440 QW=LEN(SP$(K(Y))):FORI=1TOQW
:LINE(26*I-4,150)-(26*I-26,174),
PSET,B:NEXTI:FORI=1TOQW:Z$=MID$(
SP$(K(Y)),I,1):Z=ASC(Z$)-64:PMOD
E3,5:LINE(A(Z,1),A(Z,2))-(A(Z,1)
+14,A(Z,2)+14),PSET,BF
445 X$=INKEY$:IFX$=CHR$(3)THEN44
5
450 PCOPY5TO1:PCOPY6TO2
455 IFX$=CHR$(92)THEN515
460 PCOPY7TO1:PCOPY8TO2
465 IFX$=G$(Z)THEN475ELSEIFX$=""
THEN445
470 FORJL=1TO6:PMODE4,1:SCREEN1,
0:FORJK=1TO90:NEXTJK:SCREEN1,1:F
ORJK=1TO90:NEXTJK,JL:NW=NW+1:GOT
O445
475 PCOPY7TO5:PCOPY8TO6
480 PMODE3,1:AA$=Z$:B=170:CL=3:D
RAW"BM"+STR$(A)+","+STR$(B)+"S8C
3"+L$(Z)+"S4":A=A+26:NR=NR+1:AA$
=G$(Z):GOSUB205:NEXTI
485 AA$=PR$(K(Y)):GOSUB205:FORJK
=1TO300:NEXTJK:GOSUB205:NEXTY
490 FORWW=1TO500:NEXT:GOTO515
495 DRAW"C3U14R14D14NL14BR4":RET
URN
500 DATA22,38,108,56,72,56,58,38
,56,20,76,38,94,38,112,38,146,20
,130,38,148,38
505 DATA166,38,144,56,126,56,164
,20,182,20,20,20,74,20,40,38,92,
20,128,20
510 DATA90,56,38,20,54,56,110,20
,36,56
515 CLS:PRINT@101,"YOU TRIED"NR+
NW"TIMES AND":PRINT@165,"ANSWERE
D"NR"CORRECTLY"
520 PRINT@229,"WHILE DOING"NW"WR
ONG."
525 NQ=NR+NW:IFNQ=0THEN NQ=1
530 MS=INT(NR/NQ*100)
535 PRINT@293,"YOUR SCORE IS"MS"
%."
540 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
545 X$=INKEY$:IFX$="Y"THENRUN
550 IFX$="N"THENCLS:END
555 IFX$="C"THENPMODE4,1:SCREEN1
,1:PMODE3:GOTO445
560 GOTO545
1000 DATA SURVIVOR,SERVI VOR
1010 DATA LUCKY,LUCKY
1020 DATA RAINBOW,RAYN BOW
1030 DATA CHOCOLATE,CHAUK O LET
1040 DATA DANGEROUS,DAYN JUR US
1050 DATA HAMBURGER,HAMBURGUR
1060 DATA DEPARTMENT,DEPARTMENT
1070 DATA NATIONAL,NASHUNNEL
1080 DATA RECOVERY,RE CUVVERY
1090 DATA PROJECTION,PRO JECKSHU
N
5000 DATA END,END
```



EDUCATION NOTES

16K
ECB

Number Fun for the Very Young

By Steve Blyn
Rainbow Contributing Editor

This month's program is geared to preschoolers and children in early primary school. It is a review of the numbers 1 through 9. We are aiming at reinforcing which number comes before and after each of these numbers. In the beginning, children will no doubt need some adult assistance to read the directions. However, after they have played the game for a while, many will probably be able to proceed independently.

There is no scoring or true end to this program. We feel it is pointless to give a child this young a numerical score. Frequent graphics and musical rewards are more appropriate for this age group. After any example, the child may either press the ENTER key to go on or the E key to end the program.

There is little pressure when incorrect answers are given. Nothing at all happens if any of the letter keys are pressed. A short sound is heard if a wrong number is pressed. The child can make as many attempts as he needs to get the correct answer.

The program only proceeds when a correct response is made. A pleasant tune is played and graphics are drawn on the screen. The graphics are random figures of a triangle, circle and square. This adds an extra dimension to the program; the three figures are often learned at about the same age as these numbers are studied.

Reinforcement is therefore only for positive answers. This is in keeping with our longstanding policy of presenting no discouraging feedback to the very young child. We only want them to have positive feelings toward their computers. Early experiences and feelings may certainly carry over to later ages. We want no child to "turn-off" to computers at any age, least of all at an early age.

The program begins by executing a `GOSUB` to Line 390. Lines 400 through 650 read the strings to draw the letters and numbers that are needed. The program then returns to lines 40 through 90, which set up the high resolution screen and print the words "Which Number Comes." Line 110 decides whether the question will read "Before" or "After." Either of these words then becomes `QQ$` on Line 140. Line 150 prints the number in question as `Z$`.

The number we are looking for is the variable `R`. If the word "Before" was selected, then `R=R-1`. Similarly, if the word "After" was selected, then `R=R+1`. Lines 120 through 130 take care of this job.

Lines 160 through 270 draw a random triangle, circle and square. This is done to both reinforce learning these three shapes and to add some more pizazz to the program. We have found that it is a good idea to add as much color, sound and interest as possible to programs targeted for early childhood or preschool youngsters. They can often be distracted away from the computer: An extra graphic here and there never hurts in holding their attention.

Lines 280 through 330 get and evaluate the child's answer. If correct, the graphics appear and a happy tune is played. If an incorrect number is pressed, a short tune is played. After a correct response, the child is prompted to press ENTER. Only by pressing ENTER will another example be displayed. The program will end if the E key is pressed.

Please feel free to alter this program to suit your needs. One suggestion is to change the three geometric figures used if your child or class tires of them. Another fairly easy modification would be to alter the program for the numbers from 10 to 99.

We at Computer Island hope your youngster learns a little and has fun playing with this program. As always, we enjoy hearing about your experiences with our programs. ☐

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: NUMREVUE

```
10 REM"NUMBER REVIEW"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1987
30 CLEAR 2000:QT=RND(-TIMER):GOS
UB 390:R=RND(8)
40 PMODE 3,1:PCLS:SCREEN 1,1
50 COLOR 6:LINE(55,3)-(200,25),P
SET,B:LINE(50,0)-(205,28),PSET,B
:PAINT(52,2),6,6
60 DRAW"C7A2S12BM80,5"+N$+U$+M$+
B$+E$+R$+S$
70 DRAW"C0A2S8BM20,40"+W$+H$+I$+
C$+H$
80 DRAW"BM110,40"+N$+U$+M$+B$+E$
+R$
90 DRAW"BM210,40"+C$+O$+M$+E$+S$
100 IF R=1 THEN Z$=N1$ ELSE IF R
=2 THEN Z$=N2$ ELSE IF R=3 THEN
Z$=N3$ ELSE IF R=4 THEN Z$=N4$ E
LSE IF R=5 THEN Z$=N5$ ELSE IF R
=6 THEN Z$=N6$ ELSE IF R=7 THEN
Z$=N7$ ELSE Z$=N8$
110 A=RND(2)
120 IF A=1 THEN QQ$=A$+F$+T$+E$+
R$:R=R+1
130 IF A=2 THEN QQ$=B$+E$+F$+O$+
R$+E$:R=R-1
140 DRAW"BM60,70"+QQ$
150 DRAW"C7BM150,70"+Z$:GOTO 280
160 REM"DRAW A TRIANGLE"
170 LINE(0,90)-(255,92),PSET,BF:
LINE(0,176)-(255,178),PSET,BF
180 B=RND(150):B1=100+RND(10)
190 C=50+RND(100):C1=110+RND(50)
200 D=RND(50):D1=100+RND(40)
210 LINE(B,B1)-(C,C1),PSET
220 LINE-(D,D1),PSET:LINE-(B,B1)
,PSET
230 REM"DRAW A SQUARE"
240 LINE(C+50,C1+20)-(C+100,C1-2
0),PSET,BF
250 REM"DRAW A CIRCLE"
260 CIRCLE(C+RND(20),B1+20+RND(2
0)),3+RND(15)
270 PAINT(0,93),8,7:RETURN
280 EN$=INKEY$
290 IF EN$="" THEN 280
300 IF ASC(EN$)>57 OR ASC(EN$)<4
8 THEN 280
310 IF EN$="" THEN 280
320 IF VAL(EN$)=R THEN 330 ELSE
PLAY"AAA":GOTO 280
330 PLAY"L100O4CEGCEGBAGFDC":GOS
UB 160
340 COLOR8:DRAW"BM50,180"+P$+R$+
E$+S$+S$+SP$
350 DRAW+SP$+SP$+E$+N$+T$+E$+R$
360 AN$=INKEY$
370 IF AN$=CHR$(13) THEN RUN ELS
E IF EN$="E" THEN 380 ELSE 360
380 CLS:END
390 REM"HERE ARE THE STRINGS FOR
 THE LETTERS AND NUMBERS
400 A$="BEHUNU2R4NU2DGL2BGBL6"
410 B$="BEHENR3HER3D4L3BGBL6"
420 C$="BU4ER2FD2GL2HBG2BL4"
430 E$="BER3U2NL2U2L4BG5BL2"
440 F$="BUR4U2NL3U2BG5BL5"
450 H$="BUU2NU2R4NU2D2BGBL9"
460 I$="BR2BUU4BU2BD7BL8"
470 M$="BUNU4E2F2U4BG5BL5"
480 N$="BUU4F4U4BG5BL5"
490 O$="BEHU2ER2FD2GL2BGBL6"
500 P$="BER3U2NU2L3GNFBG2BL4"
510 R$="BEHERNH2R2NU2D2L3BGBL6"
520 S$="BU2FR2EHL2HER2FBG4BL6"
530 T$="BUR2NU4R2BDBL10"
540 U$="BUU3ER2FD3BGBL9"
550 W$="BUU4F2E2D4BGBL9"
560 N1$="BE2NU3DEBFBGBL9"
570 N2$="BENR3HER3U2L4BG5BL"
580 N3$="BENR3HENR2HER3BG5BL5"
590 N4$="BENU4E3L4BG4BL2"
600 N5$="BER4U2L3HER3BG5BL5"
610 N6$="BU2FR2EU2NHGL2HER2BG5BL
4"
620 N7$="BUNR4UE3BG5BL4"
630 N8$="BER2EHEHL2GFNR2GFBGBL6"
640 SP$="BE4BUBG5BL5"' ***SPACER
650 RETURN
```

Hint . . .

Solves Printer Predicament

For some time, my 3-year-old Gemini 10X has been shoving the ribbon up above the pins, thereby printing several blank spaces. To correct the problem, I had been holding the ribbon in place with a pencil on either side of the print head. On a recent visit, my son was able to help me out of this predicament (a welcome relief, as holding the ribbon manually was a real pain in the back).

He carefully removed the printer head and pointed out the large amount of dried ink stuck under the plate. After removing the offending material, he replaced the head and the printer works great. If your printer has these symptoms, you might want to try this procedure. Just be very careful when working with the small print head parts — new heads are still somewhat expensive.

Douglas C. Shelton
Little Rock, AR

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The Battle Line Is Being Drawn

By Cray Augsburg
Rainbow Technical Editor

Since it started in September 1985, the CoCo SIG has steadily grown to become one of the largest and busiest SIGs on Delphi. While the SIG staff certainly deserves a lot of credit, the SIG members themselves are the most important reason for this growth. To a large extent, we have tried to mold the CoCo SIG in a fashion that would be of most service to its members. We are now introducing a new aspect to the SIG, which will greatly enhance its information value.

Beginning in the month of August, members of the CoCo SIG will be allowed to participate in what is called Battle Line. Each month, a subject will be chosen and SIG members are invited to share their views on that subject. We will offer conferences that may well turn into controversial debates, and all are invited to attend. These conferences will be looked upon as a no-holds-barred opportunity for everyone to express their viewpoints. In addition, throughout each month, polls will be posted in the Polls section and the Forum will be used by members to express their views. At the end of each month, all Polls, Forum messages and conferences related to the Battle Line subject will be archived in the database for later perusal by members. The OS-9 Online SIG will also be running Battle Line and may or may not be discussing the same subject as the CoCo SIG.

Battle Line will give everyone a chance to "get on a soapbox." While we will be in charge of picking the topic each month, all members are encouraged to suggest ideas for these topics. We also expect SIG members to volunteer to lead a conference. When Battle Line becomes a big hit, it is very possible we will shorten the time devoted to each subject. Instead of a month, we might discuss a topic for a week or two weeks. This all depends on the reaction of the SIG members to Battle Line.

The Battle Line topic for August has not been chosen at the time of this writing, so go ahead and send your suggestions to **Jim Reed** (JIMREED) or **Marty Goodman** (MARTYGOODMAN) via Mail or Forum. To suggest topics for Battle Line in OS-9 Online, contact Jim Reed or **Greg Law** (GREGL). In the interest of letting everybody in on it, we do ask that you try to use the Forum as much as possible. For more details, watch the Forum for messages.

New Delphi Handbook

Michael A. Banks (KZIN), SIGop of the Science Fiction SIG on Delphi, has been fairly busy writing a new manual

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Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is CRAY.

DATABASE REPORT

Following the introduction at RAINBOWfest of an outstanding graphics editor, *Color Max 3*, a lot of interest has been focused on generating and converting pictures to use with it. For instance, many of the Atari ST graphics screens can be converted very simply into a display format that is compatible with the CoCo 3. Many of the uploads we've seen this past month have been graphics related.

Many users are also interested in converting their favorite game programs to make use of the enhanced capabilities of the CoCo 3. One by one, users are uploading their best games, converted for the CoCo 3.

OS-9 Level II is becoming available in most areas around the country, and users are hard at work writing patches and applications for it. The OS-9 Online SIG is busy with contributions from users across the country.

OS-9 Online

In the Graphics topic area, **Toni Ryan** (TNTRHODAN) sent us `BDRAW.AR`, a BASIC09 procedure that demonstrates a mouse interface, graphics pointer and menu handling. **Kevin Darling** (KDARLING) sent us some Level II pictures and a Level II picture loader. These two pictures, *Pharoh* and *Saturn*, are converted Atari ST pictures in VEF (VDG Enhanced) format. They may be viewed using the *Pix* program that is also in the Graphics topic of the database.

In the Users Group topic, **Greg Law** (GREGL) has posted seven more additions to this expanding section of the database. New groups include *BASUTIL*, a package of two assembly routines to set the user ID number one to return the name of the driver that is in use; *CHKNG*, a checkbook program; *CAT*, a UNIX-style file concatenation utility; *CB*, which reformats C for Delphi over the past six months. The new book, *DELPHI: The Official Guide*, is being published by Brady Books, a division of Simon and Schuster. Through Delphi, the 400-page book will sell for $19.95 and includes a coupon for two free online hours for *new* subscribers. Unfortunately, present subscribers will not be able to use this coupon.

DELPHI: The Official Guide is divided into four major sections. The first section, "Getting Started," deals with sign-up and logon procedures. The second section discusses the menu concept and how it is employed on Delphi. Also, this section covers the system commands, such as `SEND` and `/WIDTH`, and control characters. The third section details each area of Delphi and discusses how they can be used. Coverage of topics like Mail, the Library and SIGs will be included here. Rounding out the book is the reference section, where various network numbers are listed. This section includes a glossary of terms and a troubleshooting guide.

Polls, Polls and More Polls

RAINBOW columnist **Richard White** (DICKWHITE), author of "Bits and Bytes of BASIC," has been chosen by Jim Reed to serve as Polls Manager. Richard's duties will include editing new polls and archiving old polls to make room for new ones in both the CoCo SIG and OS-9 Online. And speaking of new polls, Richard has just finished archiving several old entries, so there is plenty of room for you to create a survey on those subjects dearest to your heart.

Upcoming Changes

Delphi has told us that they have started "phase two" for the system changes in the Database area. Some of the more important (and most wished for) changes to be made are:

- Providing a clearer indication before a download is initiated of whether a particular file is in ASCII or binary format (Text vs. Non-Text).
- Allowing semiautomatic download of all files in a given group. This change will become more important as software writers start allowing the use of Kermit on the CoCo.
- Changing the `DOWNLOAD` option at the `ACTION>` menu to allow the user's choice of Xmodem, Kermit, buffer capture, etc., with this choice remaining in effect throughout the session unless overridden. Delphi also hopes to allow a Profile setting for preferred download method.
- Allowing "serialized" downloads of programs so that the system will send Mail to the owner and downloader registering serial numbers. This will be a great boon to shareware uploaders.
- Increasing the number of possible topics allowed in the database. At present, all SIGs are limited to 16 database topics.
- Allowing users to:
  search by ownername.
  search by date.
  search on more than one topic at a time.
- Allow a `DIR NEW` command that would give a directory of only those files in a given topic that have been posted since the last time you entered the database.
- Changing `SUBMIT` to respect the prompt mode you are currently using. For those who are very familiar with `SUBMIT`, this will greatly reduce the amount of time it takes to go about your business.
- Allowing `/SEND`, `/WHO` and `MAIL` at the `DBASES>`, `ACTION>` and `WS>` prompts.

We will try to keep you apprised of the situation as these, and other, changes take place. In the meantime, please bear with the Delphi service people as they go about making the changes. There may be times during the week*days*, for those of you who are on during this time, when you will find yourself temporarily "locked out" of the SIG or Database area. This is a necessary precaution Delphi must take and, when it occurs, rarely poses a problem for more than a half hour or so.

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programs along the lines of the K&R manual; and *COMM*, a smart terminal program that saves the input text in a buffer and dumps it to a file later.

In the Applications topic, **Sam Johnson** (SDJ9060) has sent us the *CUTNPAST* utility written in BASIC09 for fairly heavy Delphi users who like to save, file and reread some of the Forum messages they download.

In the Utilities topic, Kevin Darling has given us his *SCF Editor Plus* for OS-9 Level II and more of his utilities for Level II. Greg Law has posted `MOUSE.B09`, a short BASIC09 program that demonstrates the use of Level II's system calls to support a mouse. Greg also provided the file compression/decompression utility called *AR*.

The Patches topic area was enhanced by the addition of *BOOTPATCH* from **Dave Philipsen** (DPHILIPSEN). This is a short script file for patching the `OS9Boot` module for faster step rates.

CoCo SIG

In the General Information topic area, **Eric Crichlow** (DIAWA) provided a file from another person concerning a pirate's justification of software theft. **Greg Miller** (GREGMILLER) then provided his rebuttal file. **Larry Hess** (BOBBIHESS) sent another side of the issue in this controversial series, called "Piracy - Another View." Greg Miller then posted his response. (This subject is also being discussed in the Forum.) **Marty Goodman, M.D.** (MARTYGOODMAN) provided another informative medical article called "AIDS and You." **Mike Fischer** (MIKE88) provided *Combustion*, a text file describing spontaneous human combustion.

In the Source for 6809 Assemblers topic area, **Mike Tolbert** (MIKEGT) posted the *EDTASM* source code for his `BOOT3.BAS` utility. `BOOT3` is a version of the popular utility `BOOT`, which has been rewritten by Mike to support a similar function on the CoCo 3. I posted an Assembly Language tutorial in response to a user's question about how to test for the key combination of SHIFT and ENTER.

Mike Ward (MIKEWARD) posted his excellent utility `EDTCVT.BIN`, which will convert *EDTASM* source code files containing embedded tabs into standard ASCII files. Tab characters are entered into *EDTASM* files whenever you use the right arrow key to advance to the next field. These tabs are stripped by BASIC and most word processors, which can result in unusable files for a user. Mike's utility cures this problem.

Roger Krupski (HARDWAREHACK) provided source code for his excellent *Morse Code Generator* utility. Those interested in studying for an amateur radio license will appreciate Roger's contribution.

In the Utilities & Applications topic area, **Glen Hathaway** (HATHAWAY) provided `T.BIN`, a short M/L program that demonstrates horizontal and vertical scrolling on the CoCo 3. **Roger Bouchard** (HARBIE) provided his *DFIX Fix* file for converting **Steve Bjork**'s *DFIX* utility for operation with ADOS. Roger also sent us a multiple disk formatter utility for those with multiple drives.

Mike Fischer sent us a BASIC program that contains his favorite patches for Disk BASIC. **Brian Wright** (POLTERGEIST) sent us his ASCII print utility for producing a hard copy of text files and his *Super DOS* utility. I provided a cataloger program for disk libraries. **Charles Pippin** (CWP) sent us his checkbook program for the CoCo 3.

In the Games topic area, **Stephen Macri** (DRACMAN) provided his newest game called *ACEY2C*. **Jim Pogue** (JIMPOGUE) provided an interesting Scrabble program, and **Dave Ferreira** (SKEEVE) provided a welcome converted *Star Trek* program for the CoCo 3.

Tom Chevrette (SHAZAC) gave us an outstanding *Escape* Adventure game that contains 29 files and consumes nearly an entire disk. The graphics screens in this program are very good. **Andrew Robinson** (AROBINSON) sent us a patch program that enables you to play the popular game *Pitstop II* in color when using an RGB monitor. Brian Wright gave us two games, called *Hotel CoCo* and *CIA Operative*. **Kurt Stecco** (HIGHRAILER) provided a program for booting some CoCo 3 game programs in color.

The Graphics topic area was enriched greatly by **Greg Miller** (GREGMILLER), who provided us with excellent renditions of Daffy Duck and Bugs Bunny. Both of these pictures are very well done, and quite colorful as well. **Bob Montowski** (GRAPHICSPUB) sent us a fine addition of *Snoopy and the Red Baron* in MGE format. **Robert Pierce** (RPIERCE) sent us his *Diddles* program, and **Mark O'Pella** (MDODELPHI) provided an XPAD program for the CoCo 3. Also, **Bob Wharton** (BOBWHARTON) sent us his fine collection of American League baseball team logos for the CoCo 3. Roger Bouchard sent us the specifications for the *Tiny* files, as well as his own ST file conversion utilities. Roger also sent us five outstanding ST pictures that have been converted into the MGE format.

Brian Wright gave us his lengthy file called *Pinup Bonanza* and a *Fan Generator* graphics demo. Eric Crichlow provided us with some excellent CoCo 3 graphics, including a graphics tribute to Steve Bjork, a picture of an Atari ST displaying a moving waterfall graphic, some proposed title screens for game programs, and an excellent animated waterfall demonstration. **Eric Tilenius** (TILENIUS) sent us his *CVLOGO BASIC* program. As you can tell, the graphics topic was really busy this month!

The Music & Sound topic of the database has also been very busy. The largest contributor to the Music topic, by far, is **Bill Starr** (WSTARR). Bill has graciously donated a total of 82 files to date, amounting to almost 300 kilobytes of music files! If you're serious about *Orchestra-90/CC*, then Delphi is definitely the place for you to be! Bill's uploads cover practically every type of music, from oldies, country and ragtime, to popular, Latin and jazz.

Gary McCarty (BANDMAN) provided several *Orchestra* files also, including *Maple Leaf Rag*, *Easy Winners*, *Solace*, and *Battle of Shiloh*. **Bryan Eggers** (SOFTAFFAIR) provided a text file describing how to write music for *Orchestra-90*.

The Data Communications topic was the scene of much excitement when **Rick Adams** (RICKADAMS) uploaded the long-awaited Version 2.0 of *Rickeyterm*. This latest version provides support for the standard serial port on the CoCo 3 for communications at 300 or 1200 baud. If you still want to use an RS-232 pack, *Rickeyterm* will then provide online printer support. Brian Wright gave us a file describing how to set up a new Avatex 1200-baud modem. I provided a short text file describing where and how to obtain the three most popular CoCo terminal programs, namely, *Greg-E-Term*, *Mikey-Term*, and *Rickeyterm*.

As you can see, this past month was a busy one for us. User activity was extremely high, and the Conference areas of the SIGs were always buzzing. We hope you'll join us on Delphi soon!

— Don Hutchison
Rainbow's Delphi Database Manager

The Rainbow Introductory Guide to

Statistics

Most people have been using statistics since they learned to talk. Statistical results and concepts turn up everywhere. A large part of our daily news consists of statistics. Results of opinion polls, surveys, research studies, the Dow Jones industrial average and, of course, our sports news are all statistics. But statistics are often misused. The informed person needs to understand the basic concepts in order to judge the appropriateness of applications.

Rainbow Contributing Editor Dr. Michael Plog and co-author Dr. Norman Stenzel have written **The Rainbow Introductory Guide to Statistics** just for beginners. It is an easy-to-understand guide to this sometimes mysterious area of mathematics. Their aim is to introduce readers to the realm of statistical processes and thinking, and they believe that the Tandy Color Computer is an ideal machine for the reduction of data.

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Rootin' Tootin' Sharpshootin' CoCo

By Albert P. Marsh

Ready for a great new game for the CoCo 3? *Shoot'n Range* is a fast-paced action/strategy game that takes full advantage of the CoCo 3's possiblities.

In this game, you are developing your sharpshooting ability at the local, official practice range. Armed with the most advanced push-button-activated solar laser gun, you are determined to shoot as many happy-faced targets as you can. With just one touch of the trigger, you can take revenge on those optimistic androids.

Of course, this man versus machine battle is not all that easy. In order to continue using the shooting range, you must keep your hit/miss percentage above 50 percent. Every shot costs you a certain amount of energy, determined by you (check the power gauge on the right side of your tracking monitor). Also, because of the new solar cycle bill passed by Congress, your gun will only re-energize every 10 rounds of play. So pick up that gun, aim carefully and fry some silicon.

Shoot'n Range requires a CoCo 3 and will work with any type of color display. You control the horizontal movement of the gun, along with the power amount, by using the right mouse/joystick. Use either button to fire the laser.

Enter the listing carefully then save and run it. As soon as the program starts, you see a screen prompting you to enter the display type you are using. If you are using an RGB monitor, such as the CM-8, press the 1 key on the keyboard. If you are using a television or composite monitor, press the 2 key.

After a short delay, a title screen appears. Press any key except BRK/ESC to continue the program. The next thing you should see is the playing field. Across the top, your score, hit/miss percentage and the gun's power level are

---

Albert Marsh is a sophomore at Antelope Valley Adventist School. He started programming in 1982 on an Apple II and has been interested in all types of computers ever since.

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DONALD DUCK'S PLAYGROUND
SIERRA
TANDY
DUNGEONS OF DAGGORATH
FLIGHTSIM 1
CAVE WALKER

displayed. Your laser pistol is at the bottom, and a marker on the right side of the screen shows the amount of power needed for that shot.

The targets appear out of the ground. Each round completed decreases the length of time the targets stay above ground. More targets are added every five rounds, and the speed slows back down again.

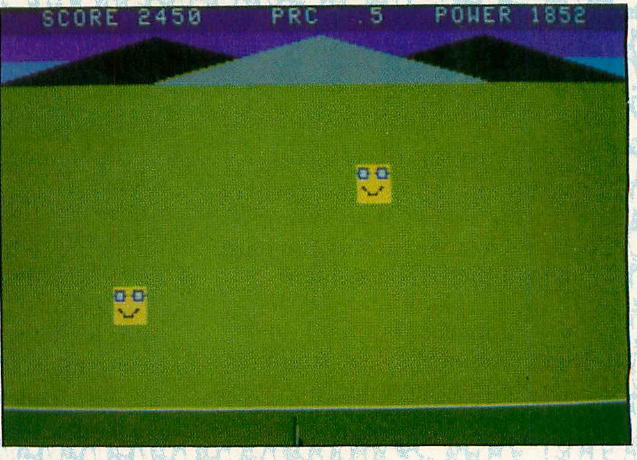
There can be a total of 10 targets on the screen. If you get past Level 20, there will be 10 targets on the screen, plus two that will appear after there is room for them.

Position the gun so it is directly under the target you want to hit. By moving the power gauge up and down with the controller, you can determine how far your shot will go.

Even though you will still hit the target, be careful not to overshoot. By doing so, you will be wasting power. You only start with 5,000 units of power, which is increased by 3,000, plus 200 times the number of rounds you completed every 10 rounds. For example, after 10 rounds you receive 5,000 units of power, after 20, you receive 7,000 units, and so on.

The game is over when you either run out of power or your percentage drops below 50 percent. You are then asked if you would like to play again. If you press the BRK/ESC key, you will be asked if you want to restart. Answer these questions by pressing Y for yes or N for no.

I hope you enjoy playing *Shoot'n Range* as much as I enjoyed creating it. If you have any questions, comments or suggestions, please feel free to write.



Good luck and have fun gaining a little revenge on modern technology.

(Questions about this game can be addressed to the author at 38850 Division St., Palmdale, CA 93550; phone: 805-273-4774. Please enclose an SASE if a written response is desired.) ☐

220	155	1390	86
400	208	1570	112
600	45	1770	39
840	121	1940	196
1010	152	END	183
1180	34		

The listing: SHOOTN

```
10 '
20 '         Shoot'n Range
30 '       copyright (c) 1987
40 '               by
50 '         Albert  Marsh
60 '
70 POKE 65497,0
80 ON BRK GOTO 1850:ON ERR GOTO
1780
90 PALETTE 0,11:PALETTE 1,63
100 HSCREEN 2:HCLS 0
110 HCOLOR 1:HPRINT(2,12),"ARE Y
OU USING 1-RGB OR 2-COMPOSITE?"
120 I$=INKEY$:IF I$="1" THEN MN=
1 ELSE IF I$="2" THEN MN=2 ELSE
110
130 GOSUB 880' SET-UP
140 PALETTE RGB:GOSUB 940' HGET
EVERTHING
150 GOSUB 1150' TITLE CARD
160 GOSUB 1240' DRAW SCREEN
170 PRC$="1.00":SC=0:PO=5000:HI=
1:AL=1:T=0:M=2:TT=2:F=50:R=1:PI=
5000
180 PALETTE CMP:ON BRK GOTO 1680
190 GOSUB 1540' SET LEVEL
200 ' MAIN LOOP
210 JA=INT((JOYSTK(0)*5)/2)*2:JB
=JOYSTK(1)*2
220 HPUT(316,JB+40)-(320,JB+40),
1,NOT
230 IF JA<>X THEN HPUT(X,175)-(X
+3,189),1,PSET:X=JA:HPUT(X,175)-
(X+3,189),8,PSET
240 IF BUTTON(0)=1 OR BUTTON(1)=
1 THEN IF PO>0 THEN GOSUB 330
250 IF NU>0 THEN FOR G=1 TO NU:T
(G)=T(G)-1:IF T(G)=0 THEN GOSUB
780:NEXT G ELSE NEXT G
260 IF NU<M AND TNO<TT THEN IF R
ND(F)=1 THEN GOSUB 640:TNO=TNO+1
270 HPUT(316,JB+40)-(320,JB+40),
1,NOT
280 IF NU=0 AND TNO=>TT THEN 300
290 GOTO 210
300 GOSUB 1370' ADVANCE LEVEL
310 GOTO 210
320 ' FIRE SHOT
330 FL=0:HCOLOR 0,2
340 FOR G=1 TO NU
350 IF X>X(G) AND X<X(G)+15 THEN
 IF JB+40<Y(G)+20 THEN FL=1:FP=G
360 NEXT G
370 IF FL=1 THEN Y=Y(FP) ELSE Y=
JB+40
380 HGET(X,174)-(X,Y),9
```

```
390 HLINE(X,174)-(X,Y),PSET
400 PLAY"L255T255O3V15;1;V-;2;V-
;3;V-;4;V-;5;V-;6;V-;7;V-;8;V-;9
;V-;10;V-;11;V-;12"
410 HPUT(X,174)-(X,Y),9,PSET
420 HCOLOR 5:HPRINT(32,0),PO
430 PO=PO-(128-JB):IF PO<0 THEN
PO=0
440 HCOLOR 0:HPRINT(32,0),PO
450 IF FL=0 THEN RETURN
460 ' HIT TARGET
470 HPUT(X(FP),Y(FP))-(X(FP)+15,
Y(FP)+16),7,PSET
480 PLAY"L255T255O1V20AV-AV-AV-A
V-AV-AV-AV-AV-AV-AV-AV-AV-AV-AV-
AV-AV-AV-AV-AV-A"
490 FOR G=Y(FP) TO Y(FP)+16
500 HPUT(X(FP),G)-(X(FP)+15,Y(FP
)+16),7,PSET
510 NEXT G
520 FOR G=FP TO NU
530 X(G)=X(G+1):Y(G)=Y(G+1):T(G)
=T(G+1)
540 NEXT G
550 HI=HI+1:NU=NU-1
560 HCOLOR5:HPRINT(8,0),SC
570 HPRINT(21,0),PRC$
580 SC=SC+100
590 IF HI/TT=1 THEN PRC$="1.00"
ELSE PRC$=LEFT$(STR$(HI/TT),4)
600 HCOLOR0:HPRINT(8,0),SC
610 HPRINT(21,0),PRC$
620 RETURN
630 ' ADD TARGET TO SCREEN
640 NU=NU+1
650 FL=0:X(NU)=INT((RND(290)+10)
/2)*2:Y(NU)=RND(100)+40
660 IF NU<2 THEN 710
670 FOR G=1 TO NU-1
680 IF INT(X(NU)/20)=INT(X(G)/20
) AND INT(Y(NU)/20)=INT(Y(G)/20)
 THEN FL=1
690 NEXT G
700 IF FL=1 THEN 650
710 PLAY"L255T255O3V0":P=0
720 FOR G=Y(NU)+16 TO Y(NU) STEP
 -1
730 HPUT(X(NU),G)-(X(NU)+15,Y(NU
)+16),6,PSET
740 P=P+1:P$="V"+STR$(P)+"A":PLA
Y P$
750 NEXT G
760 T(NU)=T+RND(10):RETURN
770 ' TAKE TARGET FROM SCREEN
780 PLAY"L255T255O3V17":P=17
790 FOR Q=Y(G) TO Y(G)+16
```

" I cannot imagine the CoCo 3 without ADOS-3; it would not be a complete machine."
The RAINBOW, July 1987

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```
800 HPUT(X(G),Q)-(X(G)+15,Y(G)+1
6),6,PSET
810 P=P-1:P$="V"+STR$(P)+"D":PLA
Y P$
820 NEXT Q
830 FOR Q=G TO NU
840 X(Q)=X(Q+1):Y(Q)=Y(Q+1):T(Q)
=T(Q+1)
850 NEXT Q
860 NU=NU-1:RETURN
870 ' SET VARIBLES AND PALETTE
880 DIM X(16),Y(16),T(16)
890 P$(1)="631618075608092537045
45448350000000000000000000000000
00000000"
900 P$(2)="630233163211274300030
0351906000000000000000000000000
00000000"
910 P$=P$(MN):GOSUB 1630:PALETTE
 15,0
920 RETURN
930 ' HGET EVERYTHING
940 HCLS 1:HBUFF 1,220:HGET(1,1)
-(20,20),1
950 HCLS 2:HBUFF 2,220:HGET(1,1)
-(20,20),2
960 HCLS 5:HBUFF 3,110:HGET(1,1)
-(20,10),3
970 HCLS 6:HBUFF 4,110:HGET(1,1)
-(20,10),4
980 HCLS 7:HBUFF 5,110:HGET(1,1)
-(20,10),5
990 HCLS 2:HCOLOR 11:HLINE(0,1)-
(15,16),PSET,BF
1000 HCOLOR 6:HCIRCLE(3,4),3:HCI
RCLE(12,4),3
1010 HPAINT(3,4),0,6:HPAINT(12,4
),0,6
1020 HCOLOR 9:HCIRCLE(7,10),5,,.
75,0,.5
1030 HBUFF 6,200:HGET(0,0)-(15,1
6),6
1040 HCOLOR 12:HLINE(0,1)-(15,16
),PSET,BF
1050 HCOLOR 6:HCIRCLE(3,4),3:HCI
RCLE(12,4),3
1060 HPAINT(3,4),15,6:HPAINT(12,
4),15,6
1070 HCOLOR 9:HCIRCLE(7,12),5,,.
75,.5,0
1080 HBUFF 7,200:HGET(0,0)-(15,1
6),7
1090 HCLS 1:HCOLOR 3:HLINE(4,1)-
(4,15),PSET
1100 HCOLOR 4:HLINE(5,5)-(5,15),
PSET
1110 HCOLOR 9:HLINE(6,10)-(6,14)
,PSET:HLINE(7,11)-(7,14),PSET
1120 HBUFF 8,300:HGET(4,1)-(7,15
),8
1130 HBUFF 9,400:RETURN
1140 ' TITLE SCREEN
1150 WIDTH 40:CLS 7
1160 LOCATE 0,3:ATTR 0,4
1170 READ I$:IF I$="999" THEN 12
00
1180 L=40-LEN(I$):L=INT(L/2)
1190 PRINT TAB(L);I$:GOTO 1170
1200 ATTR 6,6:LOCATE 39,23:PALET
TE CMP
1210 IF INKEY$="" THEN 1210
1220 PALETTE RGB:RETURN
1230 ' DRAW SCREEN
1240 HSCREEN 2:HCLS2
1250 FOR G=0 TO 320 STEP 20
1260 HPUT(G,0)-(G+19,10),3,PSET
1270 HPUT(G,11)-(G+19,21),4,PSET
1280 HPUT(G,22)-(G+19,32),5,PSET
1290 NEXT G
1300 HDRAW"C3;BM319,32;M0,32;M80
,12;M160,30;M240,12;M319,32":HPA
INT(80,20),3,3
1310 HDRAW"C4;BM80,32;M240,32;M1
60,12;M80,32":HPAINT(160,20),4,4
1320 HCOLOR0:HLINE(0,171)-(320,1
71),PSET
1330 FOR G=0 TO 320 STEP 20:HPUT
(G,172)-(G+20,192),1,PSET:NEXT G
1340 HPRINT(3,0),"SCORE 0
PRC 1.00  POWER 5000"
1350 RETURN
1360 ' LEVEL ADVANCE
1370 HCOLOR 5:HPRINT(8,0),SC
1380 PB=INT((HI/TT)*500):SC=SC+P
B
1390 HCOLOR 0:HPRINT(8,0),SC
1400 HCOLOR15:PB$=STR$(PB)+"pts.
"
1410 HPRINT(7,11),"POINTS BONUS-
  "+PB$
1420 R=R+1:IF INT(R/10)<>R/10 TH
EN 1500
1430 HCOLOR 15:HPRINT(7,13),"POW
ER BONUS - "+STR$(PI)+" units"
1440 HCOLOR 5:HPRINT(32,0),PO:PO
=PO+PI
1450 HCOLOR 0:HPRINT(32,0),PO
1460 PI=PI+2000
1470 FOR G=1 TO 10
1480 PLAY"L255T255V20O2;A;V+;B;V
+;C;V+;D;V-;E;V-;F;V-;E;V+;F;V+;
G"
1490 NEXT G
1500 FOR G=1 TO 500:NEXT G
1510 FOR G=40 TO 280 STEP 8
1520 HPUT(G,88)-(G+8,112),2,PSET
:NEXT G
1530 IF HI/TT <.5 OR PO=0 THEN 1
```

```
730
1540 NU=0:T=T-10:IF T<10 THEN T=
55:TT=TT+2:M=M+2:IF M>10 THEN M=
10
1550 F=F-1:IF F<5 THEN F=5
1560 HCOLOR 10:HPRINT(15,3),"ROU
ND":HPRINT(20,3),R
1570 FOR Q=1 TO M:GOSUB 640:NEXT
 Q
1580 FOR G=1 TO 200:NEXT G
1590 HCOLOR4:HPRINT(15,3),"ROUND
":HPRINT(20,3),R
1600 TNO=M:HI=0:JA=X
1610 RETURN
1620 ' PALETTE SET-UP
1630 FOR G=0 TO 31
1640 P=VAL(MID$(P$,(G*2)+1,2))
1650 POKE G+58964,P
1660 NEXT G:RETURN
1670 ' PROGRAM ABORTED
1680 FOR G=32 TO 288 STEP 10:HPU
T(G,88)-(G+10,112),2,PSET:NEXT G
1690 HCOLOR15:HPRINT(11,11),"-PR
OGRAM ABORTED-":HPRINT(4,13),"WO
ULD YOU LIKE TO RESTART(Y/N)?"
1700 ON BRK GOTO 1710
1710 I$=INKEY$:IF I$="Y" THEN PA
LETTE RGB:GOTO 160 ELSE IF I$="N
" THEN 1850 ELSE 1710
1720 ' GAME OVER
1730 HCOLOR15:HPRINT(15,11),"GAM
E  OVER"
1740 HPRINT(3,13),"WOULD YOU LIK
E TO PLAY AGAIN(Y/N)?"
1750 ON BRK GOTO 1760
1760 I$=INKEY$:IF I$="Y" THEN PA
LETTE RGB:GOTO 160 ELSE IF I$="N
" THEN 1850 ELSE 1760
1770 ' ON ERR COMES HERE
1780 P$="18361107633109380018006
30018003818540936632745380018006
300180038"
1790 GOSUB 1630:PALETTE 15,38
1800 IF MN=1 THEN PALETTE RGB EL
SE PALETTE CMP
1810 WIDTH 32:CLS
1820 PRINT "ERROR NUMBER - ";ERN
O:PRINT "ERROR LINE - ";ERLIN
1830 POKE 65496,0:END
1840 ' END OF PROGRAM
1850 P$="18361107633109380018006
30018003818540936632745380018006
300180038"
1860 GOSUB 1630:PALETTE 15,38
1870 IF MN=1 THEN PALETTE RGB EL
SE PALETTE CMP:WIDTH 32
1880 CLS1:POKE65496,0:END
1890 ' INSTRUCTIONS FOR TITLE
1900 '          SCREEN
1910 DATA SHOOT'N RANGE  by Albe
rt Marsh
1920 DATA " "
1930 DATA " "
1940 DATA Welcome to the Shoot'n
 Range
1950 DATA " "
1960 DATA There are only a few s
hort rules to
1970 DATA remember
1980 DATA " "
1990 DATA Use the right controll
er to play
2000 DATA " "
2010 DATA Use either button to f
ire
2020 DATA " "
2030 DATA You must keep your per
centile above
2040 DATA 50% to continue playin
g
2050 DATA " "
2060 DATA You play untill your p
ower runs out
2070 DATA " "
2080 DATA Press any key to start
2090 DATA 999
```

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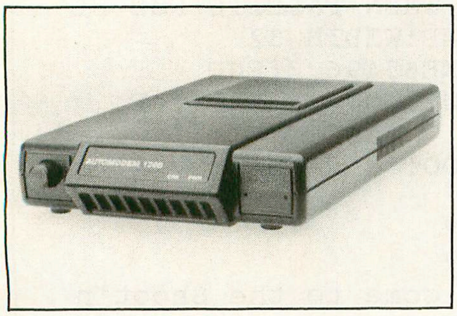


Black Box® Auto Modem 1200

TAKE IT TO THE BANK Sunrise Software has announced the release of *Business Bankbook +3* for the CoCo market. This system is designed to replace manual check register systems for small business applications. It allows complete maintenance of your checks, including check printing. System requirements are a 32K or greater Color Computer, one or two disk drives and a printer.

The program is shipped on disk only, with software for the original CoCo and CoCo 2 on Side One and special programming for the CoCo 3 on Side Two. All data is compatible with both versions of the program. *Business Bankbook +3* is priced at $49.95 plus $2 S/H. Florida residents add $2.50 state sales tax. *Contact Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322. To order, call (800) 628-2828.*

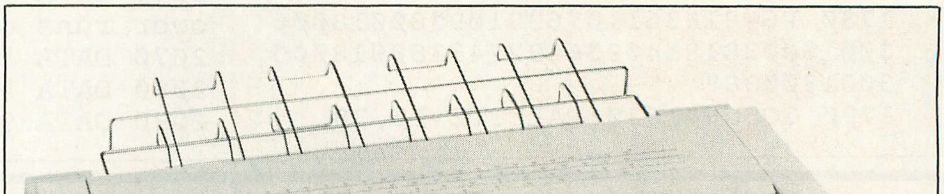
GET PROTECTED Dynamic Electronics Inc. has announced Memory Saver 2, a rechargeable battery backup designed to protect your CoCo's memory in the event of a power outage. Memory Saver 2 mounts inside the computer under the keyboard and will work with almost any Color Computer including the newer Color Computer 3 with a full complement of 512K. The unit will power the Color Computer for an hour or more. Supply switching is quick and automatic. Memory Saver 2 is priced at $39.95 plus $3 S/H. *Contact Dynamic Electronics Inc., P.O. Box 896, Hartselle, AL 35640.*

ALSO . . . Another new device from Dynamic Electronics Inc. is CC-Therm, a digital thermometer for Radio Shack Color Computers. This unit consists of a thermistor wired to the end of a flat cable and is designed to be plugged into the CoCo's joystick port. CC-Therm is priced at $12.95. A dual version is available for $19.95. The dual version allows the user to measure temperature in two locations. It is also useful for measuring inside and outside temperatures simultaneously. Software on tape or disk continuously prints the temperature in both Farenheit and centigrade. Please include $3 S/H. *Contact Dynamic Electronics Inc., P.O. Box 896, Hartselle, AL 35640.*

BIG BOY PRINTER In a move to expand its current printer product line, the Panasonic Industrial Company Computer Products Division (CPD) has announced its first entry into the rapidly growing 24-pin dot matrix printer marketplace. The new KX-P1524 wide-carriage model features three levels of print quality (draft, text and letter quality) for various applications.

Through the standard parallel port, the unit offers speeds up to 240 cps in draft mode, 160 cps in text mode and 80 cps in letter quality mode. Each mode runs at either 10, 12, 15 or 17 pitch. The KX-P1524 features Epson LQ-1500, Diablo 630 and IBM ProPrinter emulation and is compatible with most software. Its easy-to-use operator panel offers front panel access to font, pitch, margin, line and form feed, and page length for convenient user setup.

The KX-P1524 also offers optional credit card-size font cards for Roman, Bold PS, Prestige, Gothic, Orator, Script and Sans Serif font styles. A special "memo load" feature has been added, which allows the user to feed a single sheet of paper or an envelope without removing the fanfold. Both parallel and DB-25 serial interfaces are standard on the KX-P1524, which carries a suggested retail price of $899.



The KX-P1524 from Panasonic.

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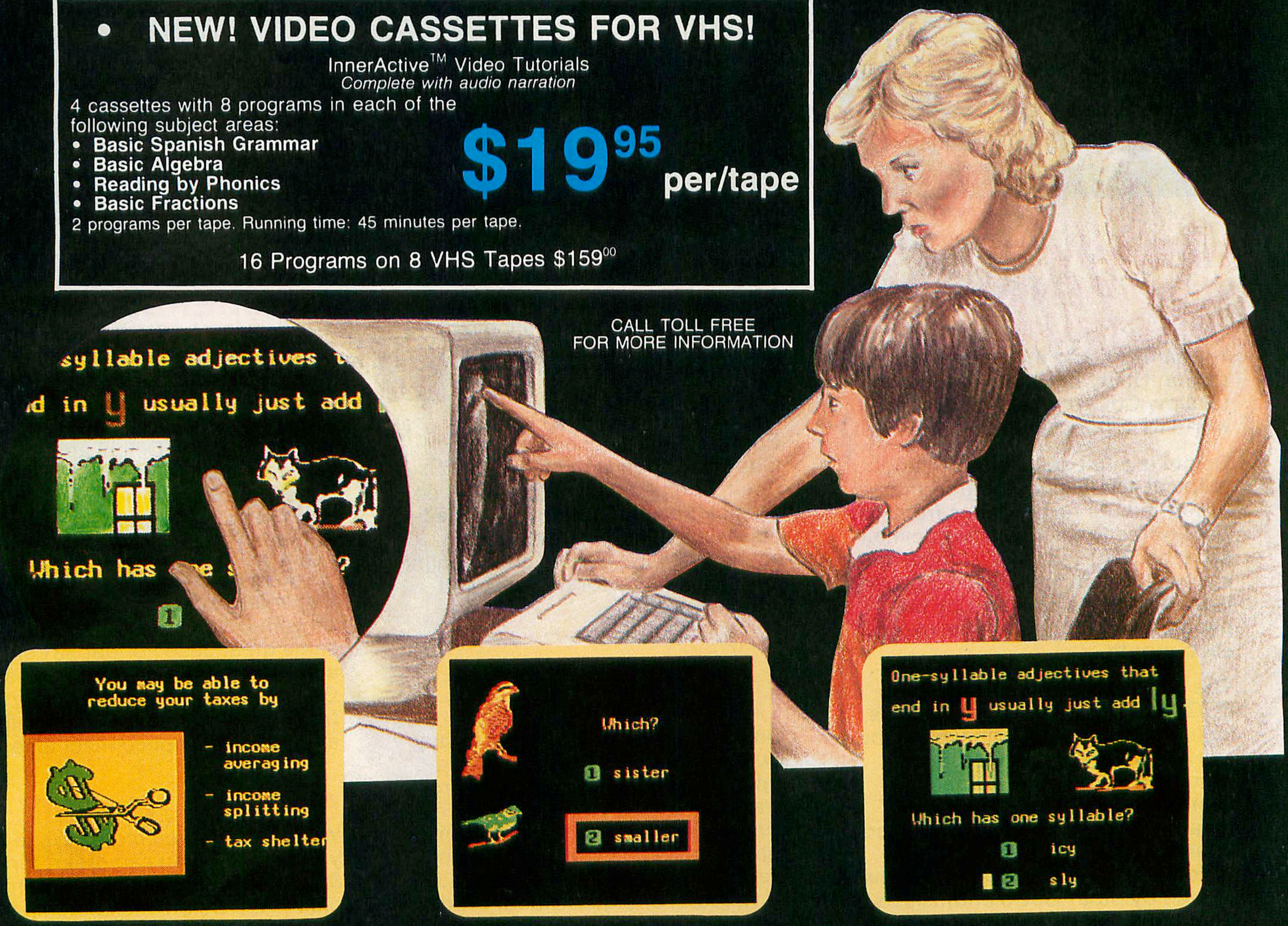

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RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $25 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

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THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $29.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $37.15 value as a ***free bonus!***

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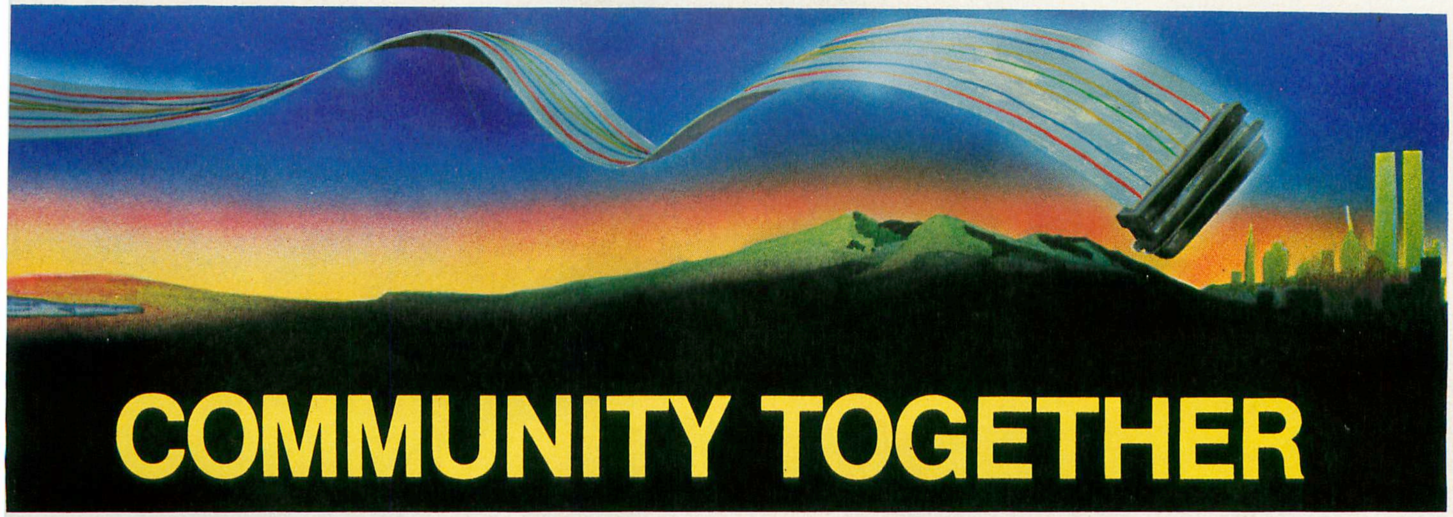
DELPHI TYPE:

GROUP COCO



How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $10.80 (U.S.) per hour.

On Telenet: Call (800) 821-5340 to get the Telenet number for your area. After you call the appropriate number for your own area and make connection, you'll see a prompt of "L?" Press ENTER, the period key (.) and ENTER again. At the "service:" prompt, type `GVC` (for General Videotex Corporation) and ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Including the $10.80 per hour surcharge, Canadian residents using Datapac are charged a total of $18 (U.S.) per hour for connect time, day or evening.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `RAINBOW`. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `SENDRAINBOW` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

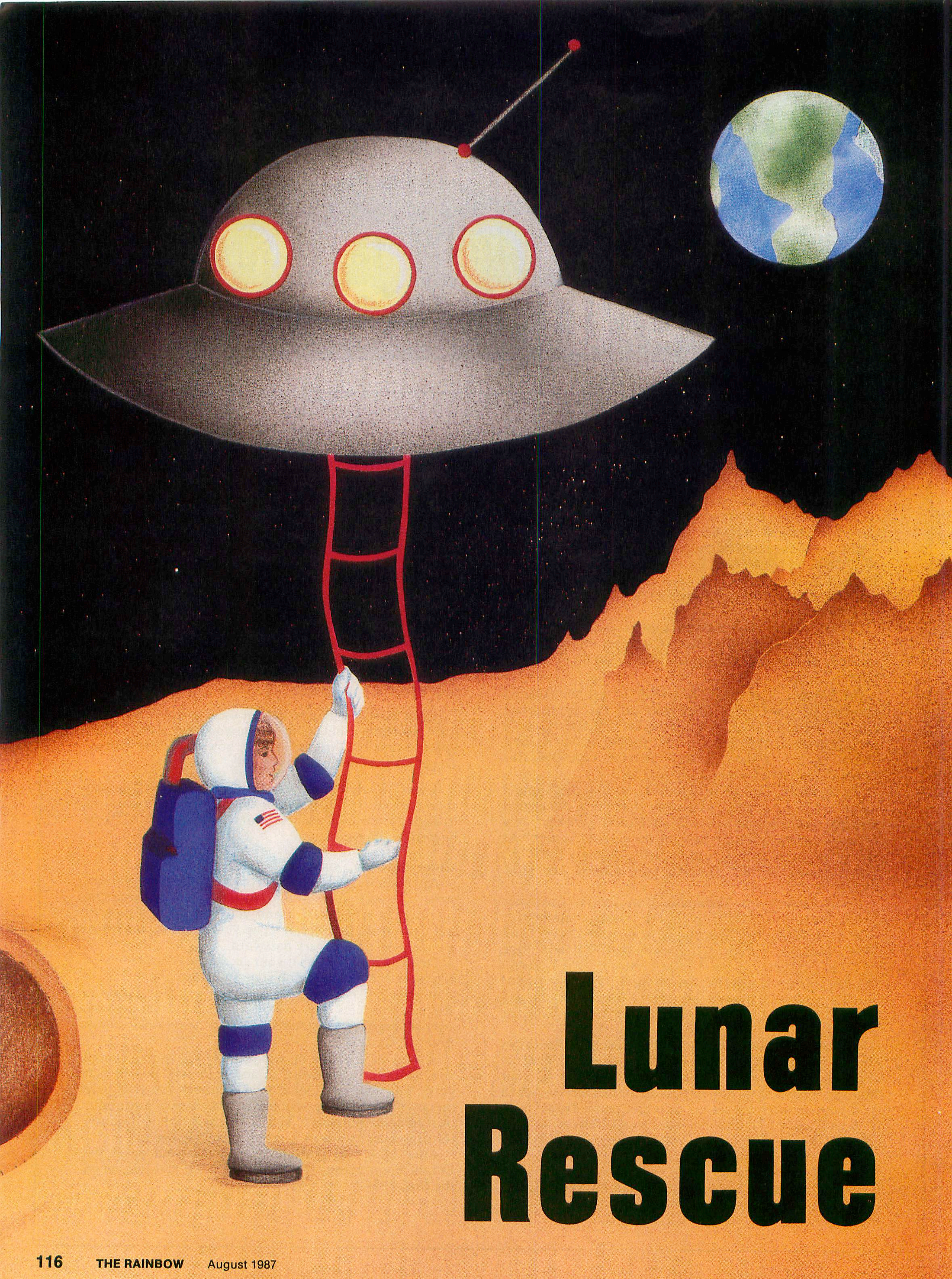
Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "username" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next business day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**



Lunar Rescue

The astronauts stranded on the moon are counting on you!

By Clyde Johnson, Jr.

Lunar Rescue is an arcade game for a 32K Color Computer. It requires at least one joystick. You are a member of the Lunar Rescue Squad, in charge of the safety of all the astronaut-explorers. To rescue astronauts stranded in the mountains, you must pilot your spacecraft to them, pick them up with the ladder, and take them to the next base. Your fuel supply is limited so there is no time to waste.

After running the program and choosing a starting skill level, the game screen will appear. Your ship is on the lower-left side of the screen, the astronaut you must rescue is in one of the valleys of the mountain range, and the base you must fly him to is on the lower-right side of the screen. The bottom of the screen is your control panel and displays altitude, vertical velocity, fuel remaining, and other necessary information. The ship is controlled with the right joystick, and pulling the stick back adds downward thrust; the farther back you pull, the more thrust. To take off, pull the stick all the way back and hold it there until you are clear of the base.

To pick up the astronaut, maneuver your ship over him and press the fire-button to drop the ladder. You have only 30 seconds to pick him up before you must close the hatch; therefore, you must be in position to get him before you drop the ladder. The ladder must be positioned directly over him and extend below his feet. The extra weight of the astronaut will pull the ship down, so be prepared to add thrust when he is aboard.

After picking up the astronaut, or at least before running out of fuel, you must land at the base. To do this you must be completely over the flat area on the right side of the screen and touch down with a velocity less than 10. You will be given a score based on your performance and, if you successfully rescued the astronaut, you will advance to the next level.

When typing in this program, be sure to save it to disk or tape before running; a machine language routine is used that could crash your computer if any typing errors are made. This routine also disables the BREAK key so you must press reset to exit the program.

(You may direct your questions to the author at P.O. Box 1197, Beaufort, SC 29901; phone: 803-525-0261. Please enclose an SASE for a reply when writing.) ☐

Clyde Johnson, Jr. is a student at Embry-Riddle Aeronautical University in Daytona Beach, Florida. He is majoring in aeronautical engineering and has had his color computer for five years.

60	29	5150	34
180	232	5310	252
310	179	5450	183
410	182	5620	60
570	180	5750	150
1050	184	6000	6
5010	130	END	71

The listing: RESCUE

```
0 '******* LUNAR RESCUE *******
1 GOTO3
2 GOTO5
3 PCLEAR8:GOTO2
5 CLEAR500,&H7C83:CLS:INPUT"WHIC
H VERSION COLOR COMPUTER ARE YOU
 USING (1,2,OR 3)";C:IF C=3 THEN
 SP=65497:WIDTH32 ELSE INPUT"CAN
 YOUR COMPUTER USE THE       'SP
EED-UP' POKE (Y/N)";P$:IF P$="Y"
 THEN SP=65495 ELSE SP=0
6 CLS:PRINT@108,"LUNAR":PRINT@14
4,"RESCUE":PRINT@239,"BY":PRINT@
330,"CLYDE JOHNSON":PRINT@485,"P
LEASE WAIT ONE MOMENT";
10 IF SP THEN POKE SP,0
20 X=RND(-TIMER)
25 FOR X=&H7C84 TO &H7FFE:READ P
:POKEX,P:NEXT:EXEC&H7C84
27 GOSUB 6000
30 DIM V(24,16),C(24,16)
40 GOSUB7000:PMODE4,1:PCLS0
45 PRINT@0,"";
46 PRINT TAB(4)"CHOOSE SKILL LEV
EL WITH":PRINTTAB(7)"RIGHT JOYST
ICK AND":PRINTTAB(10)"PRESS 'FIR
E'":PRINTTAB(12)"TO BEGIN"
47 SCREEN1,1
49 PRINT@203,"          "
50 L=INT(JOYSTK(0)/6.4)+1:PRINT@
203,"LEVEL ";L
60 IF PEEK(&HFF00) AND 1 THEN 50
61 SCR=0
62 IF (PEEK(&HFF00) AND 1)-1 THE
N 62
65 IF L>1 THEN BO=1 ELSE BO=0
70 Y3=RND(20)+10*L:Y4=RND(20)+10
*L
80 A$="D3R3NU3L3":L$="C0":M$="C1
":FOR X=1 TO 5:L$=L$+A$:M$=M$+A$
```

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```
:NEXT
90 ZZ=JOYSTK(0):IF JOYSTK(1)>35
THEN PRINT@262,"MOVE JOYSTICK TO
TOP"
100 ZZ=JOYSTK(0):IF JOYSTK(1)>35
 THEN 100
110 PRINT @262,"ONE MOMENT PLEAS
E..."
120 GOSUB7000
130 P$="L255;O1V31BV30FV29DV28GV
27EV25CV23FV21CV19GV17BV15;L210;
02;D#V13C#V11F#V9DV7AV5BV3EV1G"
140 PMODE4,1:COLOR0,1:PCLS
150 GET(7,5)-(23,16),C,G
160 DRAW"BM7,16;R2E2R4D2R2L4R2U2
R4F2R2L2H2E2U2L12D2F2H2U2R3H2U1E
2R6F2D1G2"
170 GET(7,5)-(23,16),V,G
180 PCLS:LINE(0,0)-(255,191),PSE
T,B:LINE(0,169)-(255,191),PSET,B
F:X1=1:Y1=153:PRINT@448,"ALTITUD
E","VELOCITY ","FUEL":PRINT@457,
0;:PRINT@473,0;
190 YF=70+RND(21)*5:YC=YF+15
195 Y=RND(40)
200 LINE(0,168)-(35,168),PSET:LI
NE(220,168)-(255,168),PSET:DRAW"
BM25,168":FOR X=65 TO 205 STEP 5
205 Y=Y+RND(30)*(RND(4)-2):IF Y<
1 THEN Y=1 ELSE IF Y>120 THEN Y=
120:Y=Y-RND(20)
210 IF X=YF+5 OR X=YF+10 OR X=YF
+15 OR X=YF+20 OR X=YF+25 THEN Y
=RND(5) ELSE IF X=YF THEN Y=Y3 E
LSE IF X=YF+30 THEN Y=Y4
220 IF X=YF+15 THEN YM=Y
230 XM=X:IF X=YF+5 THEN XM=XM+RN
D(2) ELSE IF X=YF+25 THEN XM=XM-
RND(2)
240 LINE-(XM,167-Y),PSET
250 NEXT
260 LINE-(230,168),PSET
270 DRAW"BM=YC;,"+STR$(167-YM)+"
;BL3E3NF3U2NR2NL2U2NR1NL1U1"
280 PAINT(128,167),0,0
290 SCREEN1,1
300 S=29:T=.7:M=100:G=1.635:X=1:
FUEL=(10-L)*500+7500:FM=FUEL:Y=0
:V=0:GH=0:TM=0:T2=0:Q=0:ML=1:LU=
1
310 PRINT@489,INT(FUEL);
320 PUT(&H1,&H9D)-(&H11,&HA8),V,
PSET
330 ZZ=JOYSTK(0):IF JOYSTK(1)<35
 THEN 330 ELSE LINE(1,168)-(12,1
70),PRESET:LINE-(25,168),PRESET:
LINE(1,168)-(24,168),PRESET:LINE
(5,169)-(20,169),PRESET:S=30
```

```
340 PUT(1,157)-(17,168),C,PSET
350 ZZ=&H17-JOYSTK(&H0):ZZ=INT(Z
Z*ABS(ZZ)/-330.75):F=31.5-JOYSTK
(&H1):F=F*ABS(F)/-&H2:F=F*((F<&H
0)+&H1)
360 IF ML AND LU THEN IF PEEK(&H
FF00)AND &H1 THEN370ELSE TI=1:TI
MER=0:PRINT@496,"TIME";:LU=0
370 FUEL=(FUEL-ABS(F/&H5)*T):FUE
L=FUEL*((FUEL<&H0)+&H1):F=F*((FU
EL<=&H0)+&H1)
380 IF FUEL THEN IF ZZ THEN FUEL
=FUEL-&H3*ABS(ZZ):X=X+ZZ:IF X<&H
1 THEN X=&H1 ELSE IF X>&HED THEN
 X=&H1
390 A=F/M:V=V-A*T+G*T:S=S-V*T:IF
 S<&H1D THEN 550
400 PRINT@&H1C9,INT(S-&H1D);:PRI
NT@&H1D9,INT(V):PRINT@&H1E9,INT(
FUEL)
410 Y=&HA6-S*(&HA6/&H1F4):IFY<&H
0 THENY=&H0
420 IF Y1>=&H1 THEN PUT(X1,Y1)-(
X1+&H10,Y1+&HB),C,PSET:IF TI THE
N DRAW"BM"+STR$(INT(X1)+&H7)+","
+STR$(INT(Y1)+&HA)+";XM$;"
430 IF Y<&H1 THEN 470
440 IF PPOINT(X,Y+&HB)=&H0 OR PP
OINT(X+&H9,Y+&HB)=&H0 OR PPOINT(
X+&H10,Y+&HB)=&H0 THEN 490
450 PUT(X,Y)-(X+&H10,Y+&HB),V,PS
ET:IF TI THEN DRAW"BM"+STR$(INT(
X)+&H7)+","+STR$(INT(Y)+&HA)+";X
L$;"
460 IF ML THEN DRAW"BM=YC;,"+STR
$(&HA7-YM)+";BL3E3NF3U2NR2NL2U2N
R1NL1U1"
470 IF TI THEN GOSUB 1000
480 X1=X:Y1=Y:GOTO 350
490 GOTO3000
500 GOSUB 4000:PRINT@0,"YOU CRAS
HED..."
520 PRINT"TOTAL SCORE ";SCR
530 PRINT" PRESS FIRE BUTTON TO
TRY AGAIN "
540 IF PEEK(&HFF00) AND 1 THEN 5
40
545 IF (PEEK(&HFF00) AND 1)-1 TH
EN 545 ELSE 40
550 IF X<220 THEN 490
555 IF S<29 THEN S=29
560 PRINT@457,INT(S-29);:PRINT@4
73,INT(V):PRINT@457+32,INT(FUEL)
570 V=INT(V)
580 IF V<=1 THEN PRINT@0,"PERFEC
T LANDING":GOTO2000
590 IF V<=5 THEN PRINT@0,"GOOD L
ANDING":GOTO2000
```

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Introducing The Coco Graphics Designer

Last Christmas we introduced our COCO Greeting Card Designer program (see review April 86 Rainbow). It has been so popular that we've now expanded it into a new program called the COCO Graphics Designer. The Coco Graphics Designer produces greeting cards plus banners and signs. This program will further increase the usefullness and enjoyment of your dot matrix printer.

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Requirements: a Coco or Coco II with a minimum of 32K, One Disk Drive (Disk Ext. BASIC 1.0/1.1,ADOS, or JDOS). Printers supported include: Epson RX/FX, GEMINI 10X, SG-10, NX-10, C-Itoh 8510, DMP-100/ 130/ 400/ 430, Seikosha GP-100/250, Legend 808 and Gorilla Bannana. Send a SASE for complete list of compatible printers.

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```
600 IF V<=9 THEN PRINT@0,"HARD L
ANDING":GOTO2000
610 GOSUB4000:PRINT@0,"YOU'RE DE
AD":GOTO520
1000 IF TIMER/&H3C>&H1E THEN TI=
0:PRINT@&H1F0,STRING$(&H10," ");
:DRAW"BM"+STR$(INT(X)+&H7)+","+S
TR$(INT(Y)+&HA)+";"+M$+"C0":RETU
RN ELSE PRINT@&H1F5,INT((&H1E-TI
MER/&H3C)*&HA)/&HA;"   ";
1010 IF X<YF+&H5 OR X>YF+&H1A TH
EN RETURN
1020 IF Y+&H18<(&HA7-YM) THEN RE
TURN ELSE TM=TM+&H1:IF TM >L THE
N T2=&H1E-TIMER/&H3C:PRINT@&H1F0
,STRING$(&H10," ");:PRINT@&H1F0,
"GOT HIM";:GH=1:M=175:ML=0:TI=0
ELSE RETURN
1030 DRAW"BM"+STR$(INT(X)+7)+","
+STR$(INT(Y)+10)+";"+M$
1040 DRAW"BM=YC;,"+STR$(167-YM)+
";C1BL3E3NF3U2NR2NL2U2NR1NL1U1"
1050 RETURN
2000 ST=INT(250*T2+12000+FUEL-FM
+(9-V)*500+2000*L)*GH:IF ST THEN
 BN=25000*BO*(L-1):BO=0 ELSE ST=
-10000
2010 PRINT"PERFORMANCE SCORE ";S
T
2020 IF BN THEN PRINT"***BONUS**
* ";BN:ST=ST+BN:BN=0
2030 SCR=SCR+ST
2040 PRINT "TOTAL ";SCR
2050 IF GH THEN L=L+1:IF L>10 TH
EN L=10
2060 PRINT "LEVEL ";L
2070 FOR DL=1 TO 5000:NEXT:GOTO
70
3000 IF ML AND X>=YF+4 AND X<=YF
+27 AND Y+24>(167-YM) THEN PRINT
@496,"YOU KILLED HIM";:TI=0:DRAW
"C1BM=YC;,"+STR$(167-YM)+";BL3E3
NF3U2NR2NL2U2NR1NL1U1":ML=0:GOTO
 450 ELSE GOTO 500
4000 IF SP THEN POKESP-1,0
4010 PLAY P$:IF SP THEN POKE SP,
0
4020 FOR RA=1 TO 31 STEP 2:CIRCL
E(X+8,Y+6),RA,0:NEXT:FOR RA=31 T
O 1 STEP -2:CIRCLE(X+8,Y+6),RA,1
:NEXT
4030 RETURN
5000 DATA 109,140,49,38,27,108,1
40,44,190,1
5010 DATA 104,175,140,39,48,140,
104,191,1,104
5020 DATA 190,1,155,175,140,30,4
8,140,29,191
5030 DATA 1,155,57,109,140,16,39
,250,111,140
5040 DATA 11,174,140,9,191,1,104
,174,140,6
5050 DATA 32,233,0,130,115,0,130
,185,52,7
5060 DATA 246,1,85,134,247,183,2
55,2,182,255
5070 DATA 0,138,128,129,247,39,4
,202,8,32
5080 DATA 2,196,247,247,1,85,246
,1,86,134
5090 DATA 239,183,255,2,182,255,
0,138,128,129
5100 DATA 247,39,4,202,8,32,2,19
6,247,247
5110 DATA 1,86,53,7,50,98,28,175
,126,173
5120 DATA 165,52,54,129,8,16,39,
0,153,18
5130 DATA 18,18,18,18,18,18,18,1
8,18,18
5140 DATA 18,18,18,198,45,49,141
,0,147,161
5150 DATA 160,39,48,49,39,90,38,
247,198,36
5160 DATA 161,160,39,7,49,37,90,
38,247,53
```

*** ASSEMBLY LANGUAGE PROGRAMMING
TRS-80 COLOR COMPUTER

THE BOOK

This hands-on guide for the CoCo 1 & 2 begins with the basics and progresses to the expert level. Written as a tutorial, it takes you each step to assembly language programming. Programming guidelines cover subroutines, stack use, and interrupt handlers. All the internal secrets of the SAM, PIA, MPU, memory, graphic display, joysticks, serial port, cassette, disk, keyboard, ROM, and sound are revealed. All this presented in a clear and understandable fashion. **The best - excellent reference book - Be a CoCo expert - 289 pages - $18.00 + $1.50 s/h**

THE ADDENDUM

This picks up where The Book left off. It describes all the CoCo 3 enhancements and how to use them with assembly language. Wow - what features and many are not explained any place else. Without this book your CoCo 3 is just idling. **Super-Res Graphics - Virtual Memory - New Interrupts - $12.00 + $1.00 s/h**

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```
5170 DATA 182,141,34,198,1,231,1
41,0,57,198
5180 DATA 57,231,141,0,91,23,2,1
73,18,231
5190 DATA 141,0,43,198,167,231,1
41,0,77,32
5200 DATA 224,141,4,141,30,32,21
8,220,136,52
5210 DATA 4,68,86,84,84,84,84,13
4,12,61
5220 DATA 134,32,61,31,1,53,4,19
6,31,58
5230 DATA 220,188,48,139,57,198,
3,79,18,18
5240 DATA 18,18,18,18,18,18,18,1
67,132,48
5250 DATA 136,32,90,38,248,198,7
,166,160,18
5260 DATA 18,18,18,18,18,18,167,
132,48,136
5270 DATA 32,90,38,239,134,0,167
,132,167,136
5280 DATA 32,57,23,255,178,48,31
,49,141,1
5290 DATA 38,141,198,22,255,129,
65,24,60,102
5300 DATA 102,126,102,102,66,124
,102,102,124,102
5310 DATA 102,124,67,60,102,96,9
6,96,102,60
5320 DATA 68,120,108,102,102,102
,108,120,69,126
5330 DATA 96,96,124,96,96,126,70
,126,96,96
5340 DATA 124,96,96,96,71,60,102
,96,96,110
5350 DATA 102,60,72,102,102,102,
126,102,102,102
5360 DATA 73,60,24,24,24,24,24,6
0,74,6
5370 DATA 6,6,6,6,102,60,75,102,
102,108
5380 DATA 120,108,102,102,76,96,
96,96,96,96
5390 DATA 96,126,77,102,126,126,
102,102,102,102
5400 DATA 78,102,118,126,126,110
,102,102,79,126
5410 DATA 102,102,102,102,102,12
6,80.124,102,102
5420 DATA 124,96,96,96,81,60,102
,102,102,118
5430 DATA 108,58,82,124,102,102,
124,108,102,102
5440 DATA 83,60,102,96,60,6,102,
60,84,126
5450 DATA 24,24,24,24,24,24,85,1
02,102,102
5460 DATA 102,102,102,60,86,102,
102,102,102,102
5470 DATA 60,24,87,102,102,102,1
02,126,126,102
5480 DATA 88,102,102,60,24,60,10
2,102,89,102
5490 DATA 102,60,24,24,24,24,90,
126,6,12
5500 DATA 24,48,96,126,48,60,102
,110,126,118
5510 DATA 102,60,49,24,56,24,24,
24,24,60
5520 DATA 50,60,102,6,12,24,48,1
26,51,60
5530 DATA 102,6,28,6,102,60,52,1
4,30,54
5540 DATA 102,126,6,6,53,126,96,
124,6,6
5550 DATA 102,60,54,60,102,96,12
4,102,102,60
5560 DATA 55,126,6,6,12,24,48,96
,56,60
5570 DATA 102,102,60,102,102,60,
57,60,102,102
5580 DATA 62,6,102,60,32,0,0,0,0
,0
5590 DATA 0,0,37,48,74,52,8,44,8
2,12
```

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72	49	11	29	44	38	55	27	16	1

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```
5600 DATA 39,24,24,24,0,0,0,0,42
,16
5610 DATA 84,56,56,84,16,0,58,0,
24,24
5620 DATA 0,24,24,0,63,60,102,6,
12,24
5630 DATA 0,24,45,0,0,0,126,0,0,
0
5640 DATA 46,0,0,0,0,96,96,44,
0
5650 DATA 0,0,0,8,24,48,97,48,72
,120
5660 DATA 72,72,98,112,72,112,72
,112,99,48
5670 DATA 72,64,72,48,100,112,40
,40,40,112
5680 DATA 101,120,64,120,64,120,
102,120,64,120
5690 DATA 64,64,103,48,72,64,88,
48,104,72
5700 DATA 72,120,72,72,105,112,3
2,32,32,112
5710 DATA 106,8,8,8,72,48,107,72
,80,96
5720 DATA 80,72,108,64,64,64,64,
120,109,68
5730 DATA 108,84,68,68,110,72,10
4,88,72,72
5740 DATA 111,120,72,72,72,120,1
12,112,72,112
5750 DATA 64,64,113,48,72,72,88,
52,114,112
5760 DATA 72,112,80,72,115,56,64
,48,8,112
5770 DATA 116,124,16,16,16,16,11
7,72,72,72
5780 DATA 72,120,118,68,68,68,40
,16,119,68
5790 DATA 68,68,84,108,120,68,40
,16,40,68
5800 DATA 121,68,40,16,16,16,122
,124,8,16
5810 DATA 32,124,47,48,72,72,72,
48,33,16
5820 DATA 48,16,16,56,34,48,72,1
6,32,120
5830 DATA 35,48,72,16,72,48,36,2
4,40,120
5840 DATA 8,8,61,120,96,16,72,48
,38,48
5850 DATA 64,112,72,48,43,120,8,
8,16,32
5860 DATA 40,48,72,48,72,48,41,4
8,72,40
5870 DATA 8,48,18,198,5,231,141,
253,145,23
5880 DATA 253,121,198,7,231,141,
253,136,198,3
5890 DATA 57
6000 PMODE4,1:PCLS1:COLOR 0,1
6010 Y=191-RND(20)
6015 DRAW"BM0,191;"
6020 FOR X=5 TO 255 STEP 10
6030 Y=Y-RND(20)*(RND(4)-2)
6035 IF Y>190 THEN Y=190 ELSE IF
 Y<70 THEN Y=70:Y=Y+RND(60)
6040 LINE-(X,Y),PSET
6050 NEXT
6060 PAINT(128,191),0,0
6070 LINE(0,0)-(255,191),PSET,B
6080 PRINT@108,"LUNAR":PRINT@144
,"RESCUE":PRINT@239,"BY":PRINT@3
30,"CLYDE JOHNSON"
6090 PRINT@483,"PRESS FIRE BUTTO
N TO BEGIN"
6100 SCREEN1,1
6110 IF PEEK(&HFF00) AND 1 THEN
6110
6120 IF (PEEK(&HFF00) AND 1)-1 T
HEN 6120
6130 RETURN
7000 FOR PA=1 TO 4:PCOPY PA TO P
A+4:NEXT:PMODE4,5:SCREEN1,1:RETU
RN
```

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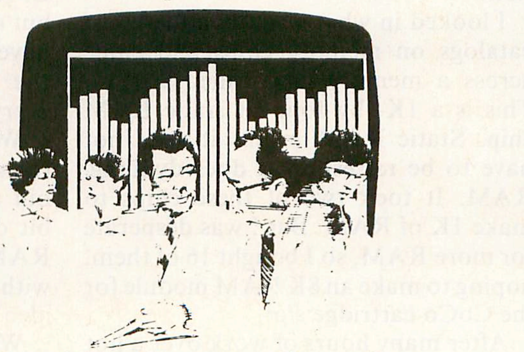

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Clever Uses for Memory

By Tony DiStefano
Rainbow Contributing Editor

Many years ago, when the CoCo first came out, I was studying the memory map of the CoCo's CPU. I had only 4K of memory then, but soon realized that this CPU could access a lot more. In fact, everyone should know by now that the CPU in the CoCo can access 64K of memory.

I soon upgraded to 16K; that was easy. Then I read an article about upgrading the CoCo to 32K using a technique called "piggyback." That was wonderful. I now had a full 32K. Remember, this was before the time of 64K chips. I also had BASIC and Extended BASIC. That was another 16K, making a total of 48K of memory. There was 16K left, which was reserved for the cartridge slot. I started to wonder how I could put more memory in there. I now have a CoCo 3 with 512K, and I am still asking myself the same question!

I looked in what were then the latest catalogs on memory chips and came across a memory chip called a 2114. This is a 1K- by four-bit static RAM chip. Static RAM means it does not have to be refreshed as does dynamic RAM. It took two of these chips to make 1K of RAM. But I was desperate for more RAM, so I bought 16 of them, hoping to make an 8K RAM module for the CoCo cartridge slot.

After many hours of work over a hot soldering iron, I managed to make this 8K module work. It was mapped from $C000 to $DFFF. (For you people who still think in decimal, from 49152 to 57343.) It was great; I was the only kid on the block to have that memory. I had many hours of fun with it.

Then came the 64K memory, and out went the 32K piggyback memory: A little bit of modification to the board and a little bit of wiring to the 74LS02, and presto — 64K of memory. That was great, but when it came time to use my 8K RAM module, it didn't work anymore. What the heck, I had 64K, so I just left it. Then I got my disk drive. It connected to the cartridge slot and there was no longer room for my 8K module. I put it on a shelf, where it gathered dust for many years.

Just the other day, I was working on something that required a little bit of memory that was protected. By protected, I mean I could not write to it when I needed. That is not the case of the CoCo in the 64K mode. You can write to anywhere in 64K when in the "All-RAM" mode. I thought of using an EPROM. It would certainly do the job, but an EPROM is a lot of trouble. You have to get out the EPROM burner, run the EPROM software, and erase it every time you have to start anew.

Well, this wouldn't do, so I went over to my long-term storage bin and pulled out my old 8K RAM module. With a bit of modification, I could make my RAM module into a ROM module, with just a switch to control it. Great idea — only one problem.

When it came time to write to the 8K module, nothing worked. I couldn't figure it out. Why wasn't I able to write to the cartridge area? After a long look at the CoCo schematic, I figured it out. When I had added the 64K memory chips, I had done a modification using the 74LS02. That modification prevented the CoCo from writing to the cartridge slot area. I was in trouble; my little 8K module was now useless.

After some thought, I came up with a solution. It required a little bit of circuitry, but I was able to write to the cartridge area. For the circuit I am presenting here, I didn't want to use 16 chips to make 8K of memory, so I looked into my newest catalog and found one chip that replaced all 16 of the old memory chips. This chip is a 6264, which is an 8K- by eight-bit memory chip all rolled into one chip; my, how technology has advanced!

Building this circuit is a two-step process. With the proper hardware, I set up a one-byte read/write memory latch and a flip-flop, mapped at $FF40. Remember them, way back when I was explaining about TTL gates? The first step is to store or poke a value into the one-byte memory. I used a 74LS374 for this, which is an octal latch. When you store the eight-bit value to that latch, you also preset half of a 74LS74. This is a D-type flip-flop with preset and clear. The output of this flip-flop goes to one side of a dual-input OR gate. You now have a valid byte in the latch and have flipped the flip-flop.

The second step is to read a byte from the 8K module. Remember that this read is to the non-writable area from $C000 to $DFFF, where the module is. The read does two things; first, it selects the 8K module. You are reading this location using a load or a peek command. But, if you look at the circuit in Figure 1, you will see that the output of the OR gate goes to the R/W (read/write) line of the memory. Normally, when you read from this location, the R/W line is high, which puts the chip in the read mode. Now that the flip-flop is flipped, however, the R/W line will go low when you read from the area. So,

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

the memory chip goes into the write mode.

But, the CPU is reading, and if the CPU is reading and the memory chip is writing, where does the data come from? Well, remember the latch? The output of the OR gate is also connected to the Output Enable of our latch. The memory chip gets its data from the latch, which is putting its data on the bus. There is no conflict because nothing else is putting anything on the bus; the CPU is reading and the memory chip wants data in the write mode. This action causes the data that we put into the latch to be put into the memory chip. That is how you write to an area of memory that is not writable. To end things, when we are finished reading, or should I say writing, the flip-flop is flopped back to the original state.

To summarize, every time you want to write to a location from $C000 to $DFFF, you must first store or poke that data to $FF40. That loads up the latch and flips the flip-flop. Then, read the location you wanted to write to, to transfer the data into it. That's all there is to it! By the way, it is automatically write-protected. You can't write to it and change the data — that is why I made this in the first place.

Now for the construction of the project. There are only four parts to it, as you can see from the schematic in Figure 1. In the case of the 74LS74 and the 74LS32, unmarked pins are unused. Here is a list of connections to the chips that connect +5V and GND:

IC #	Name	+5V	GND
U1	6264	28	14
U2	74LS374	20	10
U3	74LS32	14	7
U4	74LS74	14	7

It is recommended that you put all of these chips into sockets because if you make a mistake and burn out one of them, it is a real pain to unsolder all the connections. You will also need a board to mount the parts on. You can get such a board from C.R.C. Computers Inc., (514) 383-5293. In fact, they have all the parts you need. The standard project building tools are necessary for this project.

A note to people who are using a Multi-Pak: In order to use this module with the Multi-Pak, you must set the switch to the slot that the module is in. If you have a disk controller and are using Disk Extended BASIC, you can switch to the modules slot by software, but you will lose Disk BASIC software, and the computer will crash. A good knowledge of machine language programming and Disk Extended BASIC is necessary to avoid crashing. The same goes with the CoCo 3. You can use it with the CoCo 3, but you must know how to switch into the ROM/RAM mode. Again, a knowledge of the machine is necessary. ☐

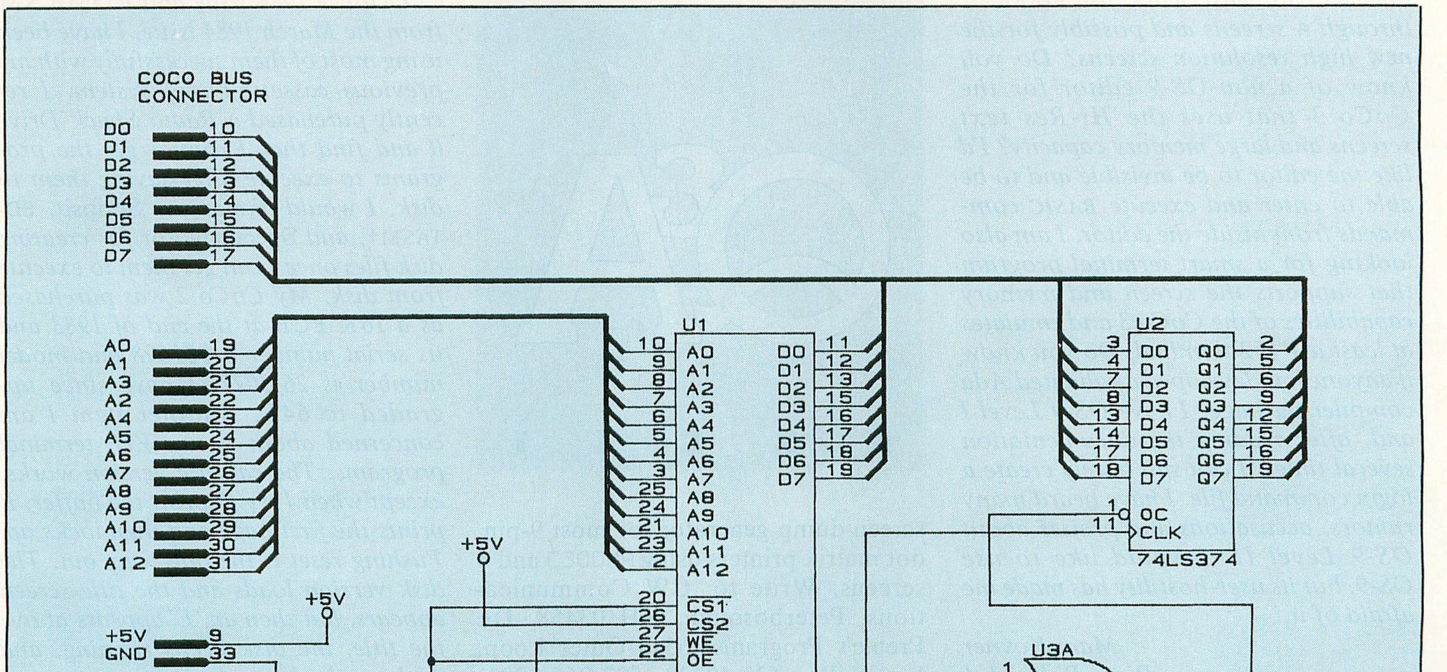
COCO BUS CONNECTOR
D0 10
D1 11
D2 12
D3 13
D4 14
D5 15
D6 16
D7 17
A0 19
A1 20
A3 21
A2 22
A4 23
A5 24
A6 25
A7 26
A8 27
A9 28
A10 29
A11 30
A12 31
+5V 9
GND 33
+5V
SCS 36
CTS 32
+5V
U1
A0 10, A1 9, A2 8, A3 7, A4 6, A5 5, A6 4, A7 3, A8 25, A9 24, A10 21, A11 23, A12 2
D0 11, D1 12, D2 13, D3 15, D4 16, D5 17, D6 18, D7 19
CS1 20, CS2 26, WE 27, OE 22
6264
U2
D0 3, D1 4, D2 7, D3 8, D4 13, D5 14, D6 17, D7 18
Q0 2, Q1 5, Q2 6, Q3 9, Q4 12, Q5 15, Q6 16, Q7 19
OC 1, CLK 11
74LS374
U3A
1
2
3
74LS32
U4A
D 2
CLK 3
PR 4
CL 1
Q 5
Q̄ 6
74LS74
+5V

Figure 1

Looking for CoCo 3 Answers

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

I recently purchased a new CoCo 3 and a Panasonic KX-P1092 DMP. Can you tell me where I can get a graphics screen dump for my printer that will at least work for `PMODE 1` *through 4 screens and possibly for the new high resolution screens? Do you know of a non-OS-9 editor for the CoCo 3 that uses the Hi-Res text screens and large memory capacity? I'd like the editor to be invisible and to be able to enter and execute* BASIC *commands from inside the editor. I am also looking for a smart terminal program that supports the screen and memory capabilities of the CoCo 3 and emulates at least a VT52 terminal. Do you know if anyone has developed a validated Ada compiler package? I have OS-9 Level I and, after reading the documentation several times, I can still barely create a login command file. I have heard many rumors, accusations and praises about OS-9 Level II. I would like to use OS-9, but its user-hostility has made me afraid of it.*

Marc Kovner
River Ridge, LA

℞ You can get a reprint of "Printer Answers" from the March 1985 issue of *HOT CoCo*. It contained a program, *VersaDump*, which is a screen-dump generator for most 9-pin, dot matrix printers using `PMODE3` and 4 screens. Write to: CW Communications, Peterborough, NH 03458. Dr. Preble's Programs (6540 Outer Loop, Louisville, KY 40228, 502-966-8281) markets *Basic Freedom*, a full-screen editor for BASIC programming ($29.95). Extended memory support for CoCo 3 BASIC is currently available only for `HSCREEN`s, RAM disks and print spoolers. The only terminal program for the CoCo 3 with VT-100 support that I know of is Cer-Comp's *Data-Pack III Plus* Version 1.1 ($59.95). You may see an Ada package for the CoCo at some future date, but I doubt if you will ever see a validated version. The most likely source of such a product would be Frank Hogg Lab. The OS-9 Level II documentation is much better than that for Level I. Level II has 1100-plus pages.

Wants to Use Disk

I have backed up my ROM packs using ROM Pack Roundup *from the October 1984 issue and* ROMRAM *from the March 1984 issue. I have been using most of them successfully with my previous cassette-based system. I recently purchased a Radio Shack Drive 0 and find that I cannot get the programs to execute after saving them to disk. I would like to use* Scripsit, EDTASM+, *and* Spectaculator *for creating disk files once I can get them to execute from disk. My CoCo 2 was purchased as a 16K ECB at the end of 1983 and its serial number is 001698 and model number is 26-3027. I have since upgraded to 64K. Another item I am concerned about is my VIP terminal programs. The cassette version works, except when I try to print the buffer. It prints the first page and then locks up. Pushing reset is the only way out. The disk version loads and the title screen appears, but then an 'E' appears above the title, the disk keeps running, and nothing else happens.*

Brock Beske
Mankato, MN

℞ For programs like *Spectaculator* that generate files, the files will still go to tape. While patching the file routines is possible, it is no simple task. The easiest way would be to purchase the disk versions of those routines. In that vein, I must ask why *Scripsit* and *Spectaculator*? These are far from the best the CoCo has to offer. I suggest you consider disk versions of *Telewriter* and *Dynacalc* as replacements. The VIP terminal program, to my knowledge, is no longer marketed. Get a disk terminal

---

Richard Esposito is a senior project engineer with Northrop Corp. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

program with XON/XOFF upload/download protocol so you can reliably transfer files and access Delphi and BBSs.

Remote Keyboard

I've read Marty Goodman's advice to those having trouble finding room for the CoCo with Multi-Pak attached. He suggested to "make a remote keyboard, and put the main CoCo system below, above, or to one side of your desk." Sounds good to me, but how does one do it? I'm not familiar with availability or sources for keyboards nor proper methods for connecting them. If keyboards are too expensive or difficult to hook up, can another computer, if readily available, hook up instead of a keyboard? And if so, how?

W.V. Barton
McPherson, KS

℞ Hold off a bit on that one. A number of companies are working on IBM PC keyboard adapters for the CoCo. I expect to see them at RAINBOWfest-Princeton.

Calling ASCII

I cannot call up ASCII format programs. I download from other systems into BASIC. *I have a CoCo 2 with cassette drive and modem D/L Program Pak. Can you help?*

Andy Brady
Lake Worth, FL

℞ After you download the programs, load them into an ASCII word processor and edit them so that each line starts with a line number and there are no statements that continue onto a second line. Save the files back to tape and then they should load OK.

Address Conversion

BASIC *programs for the CoCo are readily transferable to IBM PCs using* CoCoUtil. *However, machine language pokes within* BASIC, *when transferred, yield incorrect code due to differences in program map location. Do conversion tables exist for map location of CoCo Disk* BASIC *1.0 or 1.1 to a PC* BASIC *such as* GW-BASIC?

Robert Freedman
Mars, PA

℞ Unfortunately, the `PEEK-POKE` address conversion is not that simple. From a user's point of view, the BASICs are quite similar, while at the machine level they are different to the extent that a simple `PEEK-POKE` on one computer can easily track to a user-provided machine language subroutine in the other.

Those Noisy Drives

I purchased two TEAC FD-55As about two years ago. I have always thought they are pretty noisy, especially when compared to other computers like the Tandy 1000. Are they noisy because they are in a vertical case or because they are external? They are supposed to be good drives. Can you offer any light on the subject?

Robert Jobin
Theodore, AL

℞ The older TEAC half-high drives do run noisy. It is inherent in the drives' design and not related to their physical orientation. These drives are reputed for their reliability, and the later models (with BV suffix) do run quieter.

CoCo 3 and the RS-232

I recently purchased a Color Computer 3 and hooked my RS-232 to it, expecting it to be compatible. When I typed `EXEC&HC000`, *the computer refused to operate the interface. Upon testing the connection and the DIP switches, I noticed that the Pak worked only during the computer's first cold start. I thought all of Radio Shack hardware is compatible with the CoCo 3. Is there any way I can fix the RS-232 pack? It will not lock up after the first cold start.*

Daryl Fortney
Lancaster, PA

℞ The CoCo 3 will run many CoCo 2 programs, but not all. According to Tandy, all programs will run "if they follow the rules," but, unfortunately, not even Tandy itself has followed the rules (e.g., the recently released ROM pack *Cyrus* is not CoCo 3 compatible). June's column contained a program, `UNDO.BAS`, that will aid in running some, but not all, CoCo 2 software on the CoCo 3. The best way to use your RS-232 pack with the CoCo 3 is with a Multi-Pak interface (upgraded for CoCo 3 use) and a real terminal program with 80-column support and Xmodem upload/download protocol.

Directory Printing

I have a CoCo 2 and a DMP-110 printer plus disk drive. I use `POKE111,254:DIR` *to print out the directory. I would like to know how to move the printing during the* `POKE111,254:DIR` *to another position on the paper. This would enable me to get more use out of the paper in the printer. The program I use is modified from the one-liner on Page 28 of the May issue.*

```
10 PRINT#-2,CHR$(27);CHR$(77
(;CHR$(27); CHRT (28):PRINT#-
2:INPUT"DISK NAME";X$:PRINT#-
2,X$:PRINT#-2,"--------":POKE
111,254:DIR:PRINT#-2:PRINT#-2,
"FREE GRANULES"FREE(0)"
```

I can move the disk name and the granules by adding a `PRINT#-2,TAB(40)` *after the* `PRINT#-2` *but not for the* `POKE111,254:DIR`. *Is it possible?*

Edward Kotler
El Cajon, CA

℞ When you `POKE111,254`, you are modifying the machine language program that is accessed when you type `DIR` to use device `-2` (Note: `256-2=254`). To do what you want would require either intercepting the `CHROUT` vector with a machine language routine or writing a routine from scratch using disk I/O to read the sectors containing the disk directory directly.

Terminal Software Sources

I am interested in finding a source for MikeyTerm *or* Greg-E-Term. *I have a CoCo 2 with JDOS, RS-DOS, RS-232 cartridge and a Modem 1B without a compatible terminal program. I understand I can't contact Delphi or any other BBS, so I'm writing to find a source other than the above source.*

Richard Schultz
Carmichael, CA

℞ Both *MikeyTerm* and *Greg-E-Term* are available from the authors for $10 plus an RS formatted disk. Write the authors at: Michael Ward, 1807 Cortez, Coral Gables, FL 33134, and Greg Miller, 9575 Roston Road, Grandledge, MI 48837, respectively.

Boolean Algebra?

I have seen Line 3 in the program below in one form or another in several programs published in THE RAINBOW. *For example, the program* Palette Color Checker *in the April issue,* *Page 80, lines 100 and 110. I know that Boolean algebra is involved here, but I cannot figure out how and why it works, or why it works with the numbers 31 and 63 but not with 9 or 29. It counts from 0 to 31 over and over, but with another number it just counts 0 to 1 or not at all. Can you shed some light on this for me?*

```
10 CLS
20 P$=INKEY$:IFP$=""THEN2
30 A=A+1 AND 31:PRINT@199,A
40 GOTO 2
```

George Quellhorst
Painesville, OH

℞ Thirty-one is the equivalent of the binary number 00011111, and 63 is the equivalent of the binary number 00111111. If you `AND` a number with 63, the net effect is that you get the remainder that would result from dividing 63 into that number. The same is true for any integer number that has its binary equivalent of all consecutive 1s to the left of the decimal point. Now, 9 is the equivalent of 000001001, and 29 is the equivalent of 00011101 and consequently, with them, the above is not true. For a more complete description of why these conclusions hold, it would be necessary to go into a long treatise on Boolean algebra.

How Much Memory?

I own a Color Computer, extended, with dual disk drive. I also have the older model Multi-Pak, the Color File *cartridge, and* Color Profile. *I cannot get* Color Profile *to work even though there seems to be nothing wrong with it. There is no one in this area qualified to give instructions on it. The* Color File *cartridge works fine, with one exception. I cannot default the baud rate to the printer, hence it is extremely slow. Can the CoCo 2 be upgraded to 128K? Is there a program that would allow me to put the* Color File *cartridge onto disk and also enable me to default the baud? I have an address list of approximately 340 names and my 64K cannot handle it on one tape, so I have to load half at a time and print them before I can load the second half. I need the extra memory to handle the entire list at one time. I purchased the CoCo 3 because it has 128K only to find that all I have available is what I now have in my Extended* BASIC *CoCo.*

Ronald Rodriguez
Somerset, MA

℞ Your *Color Profile* disk should work just fine. If you are having problems with the disk, you should contact the Radio Shack from which you purchased the program. Now, in answer to your other questions, you can obtain memory upgrades to 128K, or even 512K, for the CoCo 1 and 2; however, this memory would not be used in the CoCo as contiguous memory. As a result, it would not be used by commercial software, such as *Color File* or *Color Profile*, for data storage. In most cases, these upgrades are designed with the hacker in mind or for use as a RAM disk or print spooler. For your purposes, the best solution would be to use the CoCo 3 with OS-9 Level II and an OS-9 database program.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

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The following products have recently been received by THE RAINBOW, examined by our magazine staff and approved for the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

This month the Seal of Certification *has been issued to:*

20 Solved Adventures, a booklet listing the solutions to 20 popular Adventure games. Volumes 3 and 4 are now available in English, French and Spanish. *Lomiq, Inc., CP 105 Succursale A, Jonquiere, Quebec, Canada G7X 7V8; $8 per volume.*

ALF, an artificial learning file that generates a master file of questions and answers. The user can generate a master file for any topic and have up to 300 different answers in memory at one time. For the CoCo 1, 2 and 3. *High Altitude Software, 339 32½ Road, Palisade, CO 81526; $8.95.*

Art Deli, a set of 10 picture disks featuring holiday and seasonal pictures. Each disk contains 22 pictures for a total of 440 pictures. Every picture is black and white, `PMODE4`, and can be loaded into *CoCo Max* or your favorite graphics software program. For the CoCo 1, 2 and 3. *Specialty Projects, 4810 McCrory, Memphis, TN 38122; (901) 682-8737, $12.95 per disk; $99.95 set of 10 disks plus $3 S/H.*

Art Gallery II, an improved version of the 32K *Art Gallery* program. It now reads *Graphicom* and *CoCo Max* pictures. For the CoCo 1, 2 and 3. *Tothian Software, Box 663, Rimersburg, VA 16248; $19.95.*

Blackbook, a 16K address book that stores names, addresses and phone numbers on disk for easy retrieval. Features search selection, password protection, edit and add. For the CoCo 1, 2 and 3. *Cocotronics Software, 29 Southbrook, Irvine, CA 92714; (714) 651-0283, $7.95 plus $1 S/H.*

Color File II, a 16K filing system that helps you retrieve and use information. The program comes with five predefined file types and also lets you define your own files. For the CoCo 1, 2 and 3. *Tandy Corporation; $24.95. Available in Radio Shack stores nationwide.*

Financial Time Conversions, a 32K program that performs calculations necessary to make good financial decisions. The program enables you to compare the value of different types of transactions at the same point in time. It will also print a loan amortization list. For the CoCo 1, 2 and 3. *Prometheus Software, 14684 Joshua Tree Avenue, Moreno Valley, CA 92388; $14.*

Fraze Craze, a 128K computer version of the popular TV program *Wheel of Fortune*. Score points as you select the correct letters. For the CoCo 3. *RAM Electronics, 814 Josephine Street, Monmouth, OR 97361; (503) 838-4144, $12.95.*

GRPH200, a 16K position-independent ML graphics dump designed specifically for the Tandy DMP-200 printer. Features vertical page placement, graphics preview, and vertical or horizontal and vertical manipulation of the graphics pages. For the CoCo 1 and 2. *Seibyte Software, P.O. Box 6464, Bakersfield, CA 93386; Disk, $16.95; Tape, $15.95.*

Hall of the King III: The Earthstone Revealed, a 64K graphics Adventure game. The final chapter in a trilogy of two disk Adventures. Your quest is to enter the very heart of the mountain known as Firrhest and find the Earthstone to regain the ancient wealth and power for the Dwarvan race. For the CoCo 1, 2 and 3. *Prickly-Pear Software, 213 La Mirada, El Paso, TX 79932; (915) 584-7784, $39.95.*

Indiana Jim, a 64K Adventure game. Join Indiana Jim in his efforts to avoid danger as he eludes the Indians. For the CoCo 2 and 3. *Lomiq, Inc., CP 105, Succursale A, Jonquiere, Quebec, Canada G7X 7V8; $28.95 U.S.; $38.95 Cdn.*

LOTZALUK, a 32K program to help increase your odds of picking a winning Lotto 6/49 chance. For the CoCo 1, 2 and 3. *William Brigance, Sr., 1001 Fairweather Drive, Sacramento, CA 95833; $29.95.*

Noteland, a 32K music education program for beginners that lets you play a tune with a joystick or cursor keys and save tunes on cassette or disk. For the CoCo 1, 2 and 3. *Elegant Software, 89 Massachusetts Avenue, Box 25, Boston, MA 02115; $24.95.*

POLYTINT, a 128K program that permits recoloring of `PMODE3` and `PMODE4` images in 16 colors. For the CoCo 3. *Boiling Spring Lakes Software, 411 Pine Lake Road, Southport, NC 28461; (919) 845-2881, $19.*

Rescue on Fractalus!, a 128K strategy game. Your mission is to rescue pilots shot down and stranded on the brutal planet of Fractalus and help lead our forces to victory. For the CoCo 3. *Epyx Computer Software, Sunnyvale, CA; $29.95. Available in Radio Shack stores nationwide.*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Judi Hutchinson

Powerful New Utilities for the CoCo 3

How many of you have bought a new utility program for your CoCo to find out that it was too much trouble to look up the loading address or figure out the offset, or, no matter what, the miserable thing crashed your computer if you sneezed at the wrong time? I know that it's happened to me more times than I want to remember. Bangert Software Systems has four utilities for the CoCo 3 that will not become dusty, never used relics. They work, they do what they're supposed to do, and they recover from a reset intact.

The system requirements are a CoCo 3, one disk drive, either, RGB or composite monitor, or a TV, and a printer for two of the four programs. They can be copied to one disk so you have almost the equivalent of an OS-9 startup file or an MS-DOS batch file.

Each utility is supplied on a separate disk, not copy-protected, along with the assembly language source code, a special file called `SPAEXIT.BIN` (which is called by pressing the reset key and leaves with all utilities still intact), and a whole barrel full of other supporting files that allow the user to list the full manual to the screen and send it to the printer, BASIC loader programs for each utility, and a master loader for all of them.

Don't let the assembly language reference scare you. You don't need it to run any of these routines. It is supplied only as an extra for those who are interested.

Each utility disk has a program called `PRINT.BAS` on it that lets you `RUN "PRINT` and be prompted as to the documents you want sent to your printer. You have the option of entering `ALL`, and I suggest that be done. Then you'll have the total manual for all four utilities, and it will give you an idea of how they interact and whether you want to purchase the rest of the package. Unless the final edition has one small bug perfected, you will have to first load `PRINT.BAS` and then list Line 40. If the last word in that line is `STARTTYP`, you will have to edit Line 40. Change `STARTTYP` to `STARTYPM`. Then type `RUN`, answer the prompts, and you can go feed the cat while the manual is being printed out. Also, when asked for the baud rate for your printer, just enter the value you're poking, not the location. That is, for 9600 enter `1`, not `150,1`.

If you don't have a printer, you may use the `LIST` program to read the same information on your screen. This is an example of the attention to detail Bangert has employed to make these utilities easy to use.

Print Spooler is probably the most useful of the package. First of all, you may `LLIST` a BASIC program to the printer, and while the printer is churning away, you can continue to edit the same program, run it, load another program and run it, or go watch TV. If you have a BASIC word processor, the document can be printed while you work on another one, clean up your disk files or write another program. Formatted `LLIST`ings can be made with a simple poke. If you're writing a program, a formatted `LLIST` will make debugging much simpler. All baud rates are allowed, whether using a serial or parallel printer.

The spooler is a tad over 11K, but will process anything within the limits of memory.

Directory Date is another important utility if you have a lot of files on a lot of disks and tend to lose track of when files or programs were last updated. It prompts the user to set the time and date on power up and stamps that information on all disk saves. That means if you type `DIR`, the time and date you saved the file will be shown.

Typ-O-Matic incorporates several functions. The first is an automatic key repeat, which repeats each key if held down for a half second. The next is an audible key click, which means when you press a key, you can hear a soft thump. Once you use these, you won't want to do without them. If you have the screen print utility installed, it can be called from *Typ-O-Matic* with two keystrokes. The last feature, and least useful, is an alternate keypad mode. The author has given 10 keys on the computer a second definition, which are accessed by pressing the ALT key. This is designed to give you a numeric keypad and hardly seems worth the trouble, but more creative types than I might think differently. Incidentally, the 10 keys plus 25 more can be redefined by the user and saved into a startup file.

> ***"They work, they do what they're supposed to do, and they recover from a reset intact."***

Screenprint prints the contents of your Hi-Res text screen to your printer on command.

There were a few aspects of these utilities that I found troublesome. The auto key repeat works with CTRL and ALT, which makes the user stop and think before typing a two-key combination using them. When the ALT key is depressed to change to the redefined keyboard, an '!' is generated on the screen. These aren't bugs, only a little awkward; however, when I called Bangert the author said he had already corrected these plus the *Print* program listing error.

I should mention one other undocumented feature of the date/time module. When you first boot your computer, you are prompted to enter the time and date. The program asks for MMDD; that is, May 1 would be entered 0501, with no provision for the year. It will accept five digits, so you can enter 05017 for May 1, 1987. Actually, you can enter the full year until October rolls around, because the leading zero is ignored.

This is an excellent package. It's user-friendly and easy to install; it can be customized to your system, thanks to the examples and the BASIC loaders, and also provides all the assembly language source code. In my opinion the key click, key repeat, print spooler and date/time routines are worth the price by themselves.

I also congratulate Bangert for publishing a program(s) that requires only six or seven commands to remember, operates transparently, uses only 112 bytes of BASIC memory, and pays attention to both the beginner and advanced user.

(Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221; 317-262-8855, $9.95 per module; All, $24.95)

— Frank Mardon

Satisfy Your Appetite for Action With *Donut Dilemma*

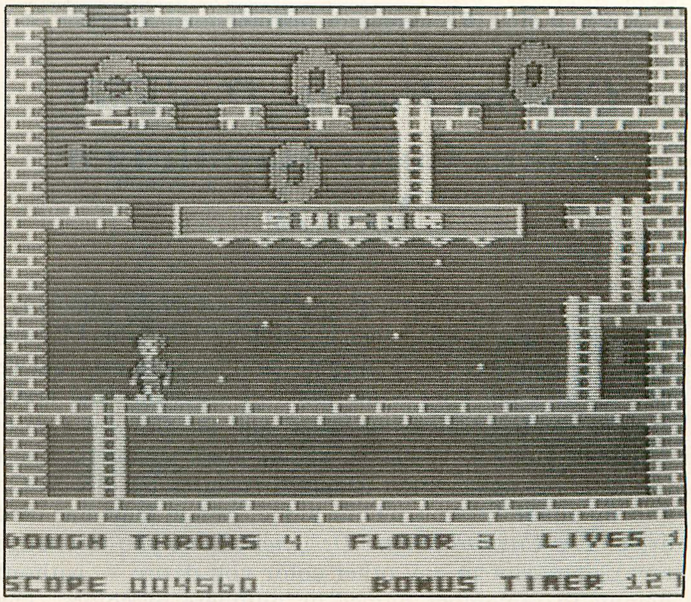
NovaSoft has added a new program, *Donut Dilemma*, to their list of excellent arcade games. The documentation is covered on two pages. As in most arcade games, you do not need much in the way of instructions; all you really need is experience. The documentation also includes a good description of the arcade scenario.

Angry Angelo has raided Antonio's Donut Factory sending everything into disarray. Donuts have come alive. They are jumping around in a wild frenzy and are deadly to the touch. Machines have gone out of control, throwing cooking fat, dough and icing sugar everywhere. All these can also be fatal to Antonio. Your job is to help Antonio climb ladders, jump platforms and ride elevators to reach the top floor and shut down the factory's power generator. For each floor level (except Floor 10), you must get to the small elevator platform that takes you up through the ceiling and into the next floor level. Unfortunately, due to circumstances beyond anyone's control, the three circuit breakers on each floor that activate the elevators have been switched off. You must, therefore, activate all three circuit breakers to activate the elevator for that floor. Bouncing donuts will be in your way. The only way to get past them is to pop them by throwing a handful of dough mix at them.

> ***"Your ultimate goal is to reach Floor 10 and deactivate the power generator to restore law and order in Antonio's Donut Factory."***

To get some dough mix, you must first get the blue bag. You see, each floor has a blue bag that contains five handfuls of dough. Your ultimate goal is to reach Floor 10 and deactivate the power generator to restore law and order in Antonio's Donut Factory. Besides having to work against all these obstacles, you also have to work against the clock. If you do get into trouble, or rather, *when* you get into deep trouble, there is a panic button available that you can use once during each game. This refills your dough bag and temporarily stalls the timer.

When you first start a game, you have the option of playing a practice game. This is a very nice feature because, otherwise, I would have never seen all 10 floors. The practice game is just like a regular game except there is no scoring and you have unlimited lives. This is where you can get all the practice you want on each level. You do have to start from the bottom, though; you cannot just pick the level or floor you want. The instructions state that Floor 9 is not impossible; it just needs a lot of thought. I can agree and add, it takes some good timing. Once you think you have had enough practice, exit the practice mode and see how good you are on the regular game.



DOUGH THROWS 4 FLOOR 3 LIVES 1
SCORE 004560 BONUS TIMER 127

Donut Dilemma only requires 32K and runs as well on the CoCo 1 as it does on the CoCo 3. I used the disk version, but it also comes on tape.

I don't think you can go wrong with *Donut Dilemma*. It can be a source of hours of fun.

(NovaSoft, P.O. Box 201, Ada, MI 49301; 616-676-8172, Tape, $21.95, Disk, $24.95 plus $3 S/H)

— Dale E. Shell

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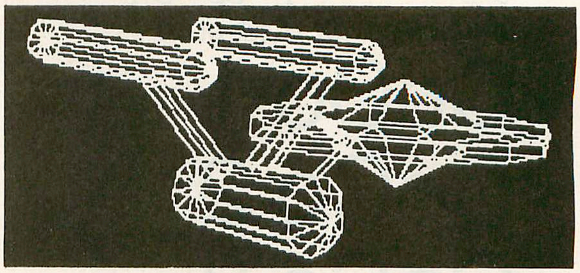

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Custom Palette Designer Makes Color-Handling a Breeze

I have been involved with the TRS-80 world since 1977 when I bought a 4K Level I, Model I computer. I have always been interested in graphics and love the way they've developed. I am always interested in programs that make graphics or color-handling easier, and the *Custom Palette Designer* Version 1.0 makes palette color manipulation a breeze. This well-written program requires a 128K CoCo 3 using either 1.0 or 1.1 Disk BASIC, and at least one disk drive. *The Custom Palette Designer* allows you to change any palette slot to any other color you desire — without having to remember names or numbers of colors. The program modifies any or all of the 16 slots (0-15) to any of the 64 colors available on the CoCo 3.

After loading the program, you are asked if you are using the RGB monitor or not, and then you are presented with the main screen, which shows the 16 default palette slots and a pointer beneath Slot 0. Altering the color contents of the palette slots is easy and handled with the arrow keys. The up and down arrows move the pointer either forward or backward one slot at a time, and the left and right arrows change the color of the palette.

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CoCo 3

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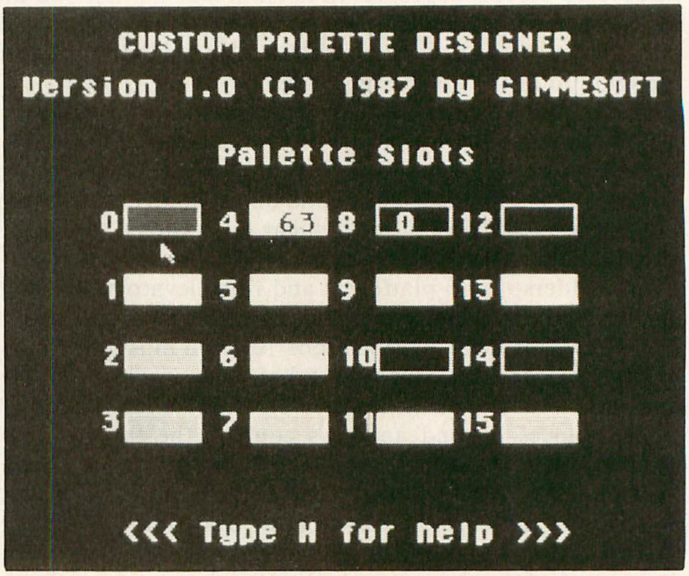
The *Custom Palette Designer* also makes use of the additional keys on the CoCo 3 keyboard. The F1 key resets the foreground color to white; F2 resets the background color to black; and the ALT key resets all the palettes back to the default colors. This is especially helpful if you make an error and need to start all over again with a clean slate. After you have the palette slots the color you want them, you have the option of saving the configured palettes to disk as an ASCII file with the line numbers of your choice so you can use the files as a subroutine.



```
CUSTOM PALETTE DESIGNER
Version 1.0 (C) 1987 by GIMMESOFT

Palette Slots

0        4   63   8   0    12
1        5        9        13
2        6        10       14
3        7        11       15

<<< Type H for help >>>
```

The power of this program is obvious. If you'd like to give your BASIC CoCo 3 programs a different look, and you use the `PALETTE` command a lot but don't want to be bothered with changing the color manually each time you run it, create several alternate palette subroutines, merge them into the BASIC program you're using, and, presto, different colors!

The *Custom Palette Designer* has a place in the library of the BASIC programmer. The manual is small but easy to use, and the software can be a great timesaver.

(Gimmesoft, 4 Hallfield Ct., Baltimore, MD 92136; 301-256-7558, $19.95)

— **Joe Simon**

Hint . . .

Useful Commands for Controlling Graphics

Most people, when writing graphics programs for the CoCo, use an infinite loop (e.g., `1000 GOTO 1000`) to make the graphics stay on the screen. In many cases, it is better to use the `LINEINPUT` or `INKEY$` commands. These commands allow you to enter a line of text or just a single keystroke, which the program can interpret, transferring control to the appropriate line. This is especially useful if you want to graph functions and you want to see several different values graphed.

Cornelius Caesar
West Germany

Basic Freedom Eases Programming in BASIC

BASIC on the CoCo is a powerful tool. It has easy to use commands to generate graphics and sound, and manipulate text and numbers, and it can access both random and sequential files on disk. Even with all this power, however, we often find ourselves wanting "just one more feature" out of BASIC. Many of those people's wishes have now been granted: Dr. Preble's Programs has just introduced *Basic Freedom*, a utility to add several new features to BASIC and simplify its use for programmers.

Basic Freedom is a full screen editor for either the original CoCo 1 or 2 or the new CoCo 3. It works in the 32-column mode, or the 40- or 80-column mode on the CoCo 3. In addition, *Basic Freedom* modified BASIC so that lowercase commands can be executed, added the ability to repeat any key just by holding it down, and makes the `LIST` command more powerful. All of this is done without losing any of BASIC's memory as *Basic Freedom* resides in high memory.

Basic Freedom comes on a non-protected disk for both the CoCo 3 and the original CoCo and on cassette only for the CoCo 1 or 2. It requires 64K on the original CoCo or 128K on the CoCo 3. In addition to the cassette or disk, *Basic Freedom* includes a six-page manual. The manual is well-written, clear and easy to understand.

Loading *Basic Freedom* couldn't be simpler. For those with the `DOS` command, simply put the disk that the program comes on in Drive 0 and type `DOS`. For those without a `DOS` command, simply type `RUN "*"`. The cassette version is loaded with a simple `CLOADM` statement. Once the program loads, it is ready to use.

To use *Basic Freedom*'s full screen editor, you type `EDIT ON`. On the CoCo 3, you can use the F2 key as a shortcut to turn the full screen edit mode on. Once you have the edit mode on, you can move the cursor anywhere on the screen with the arrow keys and edit the text on the screen with the ease of a word processor. After you edit a line of text, you move the cursor to the end of the line and press ENTER. The line is now entered into the computer with the changes you just made. While full screen editing, you may move the cursor, delete characters and insert characters. You can always tell when the editor is on by looking at your cursor. In the 40- or 80-column modes, it is solid instead of blinking when the editor is on. In the 32-column mode, the cursor blinks a single color when the editor is on.

In addition to the full screen editor and the lowercase interpreter, *Basic Freedom* also provides a more powerful `LIST` command. In addition to the normal `LIST` functions, you can list a number of lines past a line number, such as the next five lines after Line 40, you can add a semicolon to the end of a line to execute a command after the `LIST` is over, and you can add a comma to a `LIST` command to list another set of lines after the ones you list. As an example:

```
LIST 10-20,50!8,90,100-:EDIT ON
```

This command would list lines 10 through 20, eight lines starting at Line 50, Line 90, Line 100 to the end of the program and would then turn on the full screen editor.

All these features add up to a program that makes programming in BASIC much easier and faster. If you do a lot of programming in BASIC, you will like this program. The bottom line is that this is a utility. You can use your CoCo without it, but it is much easier to program in BASIC with it. Is the added ease worth the price? Yes, the price is worth what you get and is in line with the rest of the market.

(Dr. Preble's Programs, 6540 Outer Loop, Louisville, KY 40228; 502-966-8281, Disk, $29.95; Tape, $27.95)

— Mark Sunderlin

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Koronis Rift Lets You 'Shoot 'em up' and a Whole Lot More

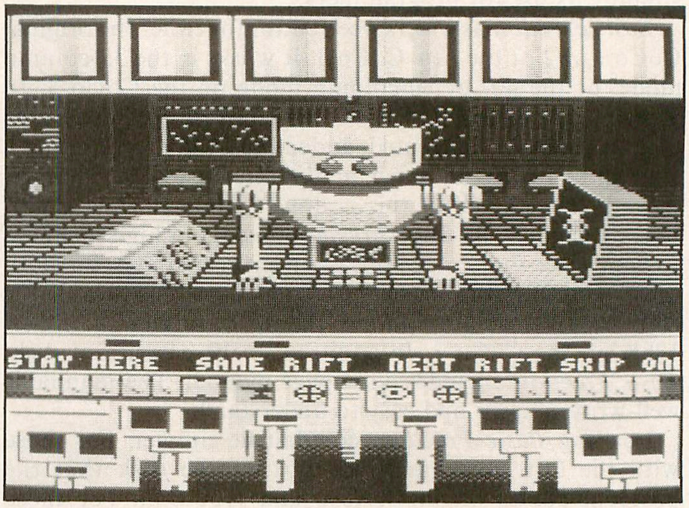
By Donald D. Dollberg

With the introduction of the Level II OS-9 operating system for the Color Computer 3, Tandy is now releasing several games that use this operating system. The latest game, *Koronis Rift*, is distributed by Tandy but was developed by Lucasfilm Games and Epyx. It will only run on a CoCo 3 and requires OS-9 Level II.

As has been Tandy's practice in the past, the OS-9 boot is on the game disk, so those not having OS-9 do not need to purchase it separately. The game is booted by typing `DOS`. For those with Disk Extended BASIC 2.0, you will need to type a short BASIC program, provided in the documentation, which performs the function of the DOS command. Upon initial loading of the game, you will be prompted as to the type of screen device available, i.e., composite or RGB monitor. Selection of the composite monitor allows viewing on a TV. Also, one joystick is required.

With the "technical" out of the way, just what is *Koronis Rift*? Since one of the developers is Lucasfilms, of *Star Wars* fame, you should have guessed that this is another space Adventure. Well, you're partially correct. This is not an Adventure game as most of us know them, nor is it a continuous "shoot-'em-up" game, although you do get a chance every now and then to shoot down the aliens.

The premise of the game is simple. You are a techno-scavenger or, in simple terms, a businessman trying to make a buck. In your trusty scoutcraft, you have come across the legendary planet Koronis, which is a high-tech graveyard of the Ancients — a confederation of over 30 different races who ruled the universe several hundred thousand years ago. The Ancients developed a technology that, even today, is unsurpassed.



Legend has it that the Ancients used the planet Koronis for testing their technology. Because of the deep rifts on Koronis, it was an ideal testing ground for powerful weapons. Until now, no one has ever found the "fabled" planet Koronis — and there it is on the view screen of your scoutcraft!

You immediately put your ship into an orbit around Koronis and prepare to scavenge the planet for as much equipment as possible. With an advanced Psytek series computer in control of the scoutcraft, you beam down to the surface in a surface rover. When you land on Koronis, your radiation alarms sound, confirming the rumors that lethal radiation exists on Koronis. Luckily, your surface rover is equipped with a repo-tech robot that does the actual salvage operations once you find one of the Ancients' hulks, which house their high-tech equipment. Using the specialized radar in the scoutcraft, you guide the vehicle toward the first hulk with the joystick.

With all of the technical capablility available to you in the scoutcraft, this operation should be a "piece of cake," but is it? As you move along the rifts, you suddenly remember the other half of the Koronis legend. The hulks are protected by the Guardians, a race of genetically-engineered warriors created by the Ancients. The Guardians were programmed by the Ancients to guard and defend their military stockpiles and have steadfastly refused to negotiate with anyone.

As you approach the first hulk on Rift 1, you are thinking of the long and dangerous task ahead. The profits are enormous and you can quit at any time. However, while collecting equipment from the Ancients' hulks, be careful that the Guardian saucers don't destroy you first. As you

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move from Rift 1 to Rift 20, you are able to make use of some of the equipment collected. You can also dismantle the equipment and eventually sell it for profit. If you make it to Rift 20, the Guardian base must be destroyed before you can claim the entire planet as your own.

Just what type of high-tech equipment will you find on Koronis and what do you do with it? The standard military systems that the Ancients used include chromoquantized lasers, which are capable of emiting a beam in a single color frequency; chromoquantized shields, which can defend against the lasers; standard power supply generators; high capacity energy storage devices; remote sensing devices, which are designed to locate specific types of hardware; electronic countermeasure devices, which are capable of interfering with enemy detection gear (making it difficult for the Guardians to find you); and propulsion modules, which can augment the power drive for the rover for different types of terrain.

As noted earlier, the Ancients were a Confederation of many races. Each race built its own version of military hardware, which was standardized throughout the Confederation. Since the races were not of equal intelligence, the same type of military hardware will have greater or lesser capability. As you travel around Koronis, you find some equipment to be more power-efficient, as well as more effective. So, you need to evaluate each item taken from the hulks and decide whether to put it into service in the rover or have it dismantled and sold for scrap.

At any time during the game, except when under attack, you can beam up to your orbiting scoutcraft. Once on board, you can have the Psytek 7500 Series Science Droid System analyze the equipment and install it in the rover to a maximum of six units or store the excess equipment in the scoutcraft's storage area. Equipment in storage can either be used later in the rover or you can have Psytek dismantle it for sale — which is how you make money, i.e., points, and eventually win the game.

Deciding which equipment modules to keep and which to dismantle is an important part of the game. Each module uses up a certain percentage of the rover's power supply and also has an efficiency percentage. The better modules use less power and are more efficient. They are found by in-depth searching, as you move from one rift to the next. As modules are found, they must be analyzed. Psytek will perform the analysis and tell you the power usage, efficiency, and how many points will be earned for dismantling each module.

Some modules, when combined in the rover, provide even greater capability. For example, the generator and power reserve modules are needed to maintain a good power flow for all of the other modules and the rover's functions. Use of modules with high power requirements slow the rover's speed and may prevent you from firing your lasers at the Guardians.

You begin the game with a laser and a shield. As you fill the rover's cargo area, you must keep in mind the obvious fact that you will need a laser, shield, generator and maybe a power reserve. With the more powerful lasers, you also need better power sources because they require time to recharge. Also, the high power lasers cannot be fired continuously, so if you don't have a good aim you may be frustrated waiting for your next chance to shoot.

Lasers and shields operate at different wavelengths or colors of the spectrum. The rover has a monitor that displays a horizontal bar graph showing the strength of the current shield in use. Six color bands are present; the length of the bar indicates how much protection your shield will give against a laser of that wavelength. Better shields give equal protection against all wavelengths. Some shields provide excellent protection against a few wavelengths and poor protection against the remaining wavelengths. This is good only if you know the color frequency of the alien's laser. The laser module works in the same way, but only fires at one wavelength.

> ***"Overall, I liked this game and enjoyed it very much. The graphics are very well done, with fine detail given to the Psytek computer system and the hulks on the planet. The animation is realistic and gives the viewer the feeling of moving up and down over the hilly terrain of the planet."***

The best laser is the one that is farthest away from the alien's color in the spectrum. On another monitor in the rover, you can find information on your current laser's operation. A vertical graph displays two bars. The left bar shows the color and amount of power available for the laser, and the right bar shows the amount of power needed to fire. The left bar decreases with each shot so the laser can only be fired after it recharges to the power level indicated by the right bar. If there is no right bar, then you can fire almost continuously. The laser recharges better when there is a good power reserve module, but the power reserve module needs a good generator too.

The documentation provided with the game is well-written and interesting. Even more interesting is the fact that the documentation never mentions the CoCo 3 but explains how to load the game into an Atari or Commodore computer! A separate instruction card provides directions on use with the CoCo 3. It appears that Tandy had Epyx port the game from these computers to the CoCo 3. This is a good sign. Since the CoCo 3 graphics screens are very similar to these machines, we should see more porting of software to the CoCo.

Overall, I liked this game and enjoyed it very much. The graphics are very well done, with fine detail given to the Psytek computer system and the hulks on the planet. The animation is realistic and gives the viewer the feeling of moving up and down over the hilly terrain of the planet. *Koronis Rift* is not a constant "shoot the aliens" game and does require the evaluation of the equipment you find so that you can make it to Rift 20. For those who like this type of game, I recommend that you start your salvage operations as soon as possible, and, "May the Force be with you."

(Epyx Computer Software, Sunnyvale, CA; $29.95. Available in Radio Shack stores nationwide.)

Color Scripsit II Provides Power and Simplicity

Radio Shack has a new word processing program, *Color Scripsit II*, for the original CoCo and the Color Computer 3. It comes on a cartridge and has no provision for disk use — all files are saved to, and loaded from, tape.

"Word processing," according to the introduction in the manual, "does for your writing what the automobile did for transportation. It provides you with a powerful new tool not available formerly to individuals." *Color Scripsit II* is aimed at the computer novice. While *VIP Writer*, for example, emphasizes its powerful features, *CS II* points to its simplicity. "Simply insert the Program Pak and turn on your computer. Select an activity from the Main Menu, and return to the Main Menu when the operation is finished."

That is not to say that *CS II* lacks sophistication. It certainly stands head and shoulders above the original cartridge *Scripsit*, which, it may be recalled, did not even permit varying the baud rate from the Radio Shack standard of 600. The new program (not a revised version of the original by any means, but a totally new program) not only permits you to select the baud rate, but also to "tune" it, if your printer happens to require such a thing. And, unlike its predecessor, *CS II* produces ASCII-compatible text files, yet can read files created by the old *Scripsit*.

Like most other word processors, *CS II* permits formatting, global search and replace, right-justification, block moving, block copying, block deleting, centering, headers and footers, page numbering, underlining and printer control codes.

CS II does not have wide, high-resolution display screens. A 38-by-24 screen, genuine lowercase characters and a variety of foreground/background color choices are available on the Color Computer 3. With the CoCo 1 or 2, you can have any display you want, as long as you want the basic 32-by-16 black on green.

The eight menu options are: Edit, View/Format, Print, Unformatted Print, Load from Tape, Append from Tape, Save to Tape and Skip Tape File. Edit is where you go to write and make changes in your text. Unformatted Print prints a hard copy of your text file with format command lines treated as though they were printable text instead of commands. Skip Tape File is the equivalent of BASIC's `SKIPF` command. It advances the tape to the start of the next file, while displaying the title of the file that's being bypassed.

Edit has two subsidiaries — command mode and insert mode. When you press E for Edit from the main menu, you are placed in command mode. Before you can start writing, you must get into insert mode. In insert mode, all you can do is write (and backspace with a destructive cursor). To do anything else, you must break out of insert mode, move the cursor to the appropriate point, and then insert or "replace" as required.

Personally, I found all this mode-switching a bit annoying, but maybe that's because I'm used to a word processor that does things differently. Also, the screen and the cursor look exactly the same in the two modes. A slight variation would have been helpful.

The view mode displays the current page of your document as it would appear if it were a printed page. What you see are not the actual characters — they would be too small to be legible — but a depiction of the location of characters and spaces on the page.

What you get is a rectangle with blocks and dashes that show you how the paragraphs will be arranged on the page. I would have liked this much better if the screen background had been white instead of green. Along with the blocks and dashes, you get a cursor (represented by a cross), which you move with the arrows until it's over the paragraph you want to format. Then you enter the format mode, where you make your formatting selections by answering the onscreen prompts. Each selection generates a format command line, which is inserted into the textfile. As an alternative, you may type your format command lines manually, in the same way that you type in text.

Perhaps the best feature of *CS II* is its instruction manual. It has 63 pages — but its size is only 4-by-4½ inches. It makes learning *CS II* easy for those who have never used a word processor.

As good as it is, however, the manual is not without its faults. It lacks an index, and one important feature called Fill is explained inadequately.

The underlining and other formatting features are command lines, preceded and followed by carriage returns, and they apply to subsequent paragraphs until amended by subsequent format command lines. But suppose you want to underline only a single word in a line, as I have just done.

That's where Fill comes in. You must type the word to be underlined as though it were a separate paragraph and then use fill to join the separate paragraphs into a single line. I had a lot of trouble figuring out how to get it to work right, finally discovering by trial and error that any line to be joined to a subsequent one must have no space preceding its carriage return and that the No Fill command must precede rather than follow the last line to be filled.

Color Scripsit II requires a minimum of 16K. On a 64K CoCo, the text buffer will hold 47,607 characters.

(Tandy Corporation; $29.95. Available in Radio Shack stores nationwide.)

— N.E. Parks

Hint . . .

A Passel of Pokes

When you ask your CoCo to print a number, it prints your number with a leading blank space if it is positive and with a minus sign if it is negative. To eliminate the sign altogether, enter `POKE &HBDE4,18:POKE &HBDE5,18`. Please note this will also remove the minus signs! To restore your CoCo so that it includes the sign, enter `POKE &HBDE4,&HA7:POKE &HBDE5,&HC0`.

If you want a plus sign instead of the blank space for positive numbers, enter `POKE &HBDDD,&H2B`. To restore your CoCo, enter `POKE $HBDDD,&H20`. All of these pokes work with the CoCo 1, 2 and 3.

Marc Gagnon
Quebec, Canada

Super Extended Basic Unravelled for the CoCo 3

Super Extended Basic Unravelled is a bound, soft-cover, magazine-sized book that details everything you want to know about the super high resolution graphics commands and BASIC enhancements on the Color Computer 3. It provides the reader with a complete and detailed, fully commented source listing of the super high resolution graphics packages available on the CoCo 3 with Color BASIC 2.0 ROM.

The book is not a tutorial or a how-to manual, but rather, a comprehensive source of the assembly listings. The reader needs to have at least a basic knowledge of 6809 assembly language programming to be able to take full advantage of the opportunities that the book offers.

The subject matter includes CoCo 3 hardware differences, memory management, super Hi-Res graphics, colors and palettes, interrupts, and Super Extended BASIC.

This book is loaded with useful information for the serious CoCo 3 hacker. I believe that the information supplied is well worth the price; in fact, the disassembled listing of Super Extended BASIC 2.0 is worth the price of the whole book.

(Microcom Software, P.O. Box 214, Fairport, NY 14450; 716-223-1477, $24.95 plus $3 S/H)

— David Gerald

CORRECTIONS

"Presenting the Smarter-Than-Average Printer Buffer" (May 1987, Page 160): This article was written by Emmett M. Lewis Jr., not Emmett J. Lewis Jr. as indicated. We apologize to Mr. Lewis for this mistake.

"Received & Certified" (June 1987, Page 130): *Leonardo's Pencil*, a graphics programming utility, was incorrectly reported to be titled *Leonard's Pencil*. We extend our apologies to E.Z. Friendly Software.

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type `DATA` at the CoCo SIG> prompt and `INFO` at the TOPIC > prompt.

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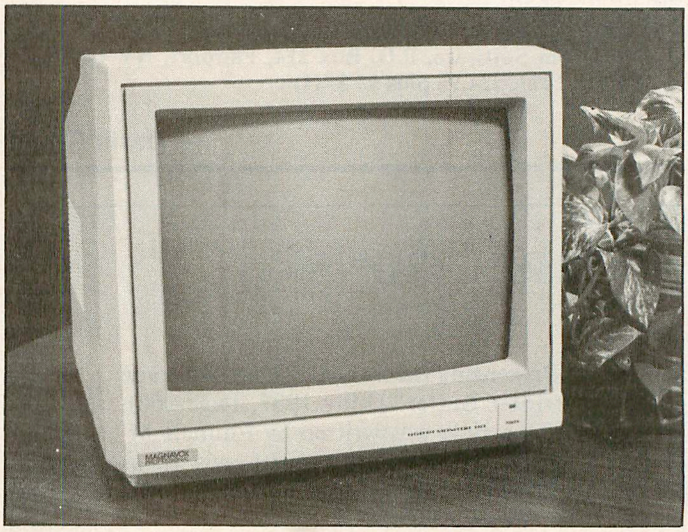
Magnavox RGB Monitor 80 Provides Plenty of Resolution and an Excellent Display

The Color Computer 3's analog RGB output certainly provides very nice pictures, but it does have its limitations — not the least of which is its inability to display the `PMODE 4` artifact colors used by many existing CoCo programs. The fact that the RGB colors are vastly different from those seen on TV sets or composite monitors (a problem only partly dealt with by the `PALETTE CMP` and `RGB` commands) doesn't help matters, especially for those who want to write programs designed to work with both types. One way to get around this is to use both an RGB monitor and a composite monitor or TV set, but this can get clumsy (not to mention the expense of buying two monitors, if that's what you need to do). Another is to use a single monitor that can switch between RGB and composite video, and the Magnavox Professional RGB Monitor 80 (model 8CM515) is one of the better ones. (I should note here that Magnavox also sells a similar monitor, model 8CM505, which is called the RGB Monitor 40; it uses a less expensive picture tube that delivers somewhat less resolution. This review deals strictly with the 8CM515.)



Don't let the Magnavox name fool you; the RGB Monitor 80 was designed and built by Philips, the European electrical giant that bought out the Magnavox TV and audio businesses some years back. Philips has a fine reputation for quality and innovation, and their skill shows in the design of the RGB Monitor 80.

The Magnavox monitor doesn't look particularly unusual; it's about the same size as most RGB monitors, and its off-white color matches the CoCo case nicely. All the controls except for the power switch are concealed behind a flip-down cover below the screen. The monitor has a tilt stand that drops down from the front edge to prop it up to a good viewing angle.

In the RGB analog mode, the RGB Monitor 80 gives a very nice display; all the CoCo 3 colors are displayed well, and the fine-pitch screen gives plenty of resolution for displaying 80-column text. The picture tube has both a tinted faceplate for higher contrast (though not quite as high as some other monitors and TV sets), and this has been treated with an anti-reflective surface that helps reduce reflected glare to a great degree. Although some monitors (such as the Sony KV-1311CR or the NEC MultiSync) do provide even better resolution, it's hard to find fault with the Magnavox display.

Composite color performance is quite decent as well, though with a few minor defects. The composite picture is just a bit less sharp than what I'm used to seeing, probably due to the low-pass filter used to keep the color subcarrier signal from appearing in the picture when the comb filter is switched out. (The comb filter circuit used by Magnavox, unlike that used by RCA and some others, has some unfortunate side effects on the picture in some situations; the RGB Monitor 80 has a switch to disable the comb filter, and for CoCo use it should be switched out.) Despite this, the Magnavox monitor provides reasonably good results on the CoCo composite video output, and when I used it to watch regular TV programs (feeding the video output of my VCR into the monitor), the pictures were very good with pleasing color fidelity. (I even tried watching a newscast from London, received by satellite, which was transmitted using the European PAL system; the Magnavox monitor automatically switched over to the "foreign" 50 Hz scan rate, although I got a black-and-white picture because the monitor was built for the U.S. NTSC system.)

The RGB Monitor 80 can also be used to display the "TTL RGBI" output of a PC-compatible computer such as the Tandy 1000; since this is only a secondary consideration to most RAINBOW readers, I'll simply say that this worked every bit as well as did the analog RGB mode. The Magnavox monitor has a "green only" switch to give you the equivalent of a green-phosphor monitor.

To sum up, I would definitely recommend the RGB Monitor 80 to anyone who has a CoCo 3; it gives an excellent analog RGB display and, even if you don't need the composite video mode, it's one of the better monitors on the market.

(Howard Medical Computers, 1690 North Elston, Chicago, IL 60622; 312-278-1440, $298 plus $14 S/H; CoCo 3 cable, $19.95 with monitor purchase)

— Ed Ellers

Software Review

Develop Programming Skills With *CoCo III Utilities*

CoCo III Utilities is a set of nine programs on disk that can be used for practical applications with many of the new features on the CoCo 3.

MEMTEST is a 128/512K memory test program.

The new high resolution screen uses 32K of memory and is not part of your BASIC program. This means that while your BASIC program no longer is limited because of graphics, you cannot directly save the screen to tape or disk. The LOADSAVE routine solves this problem.

VERSCROL is a utility that demonstrates how to smooth scroll vertically using the joystick; and HORSCROL, a horizontal direction.

CHARPOKE lets you change the attributes of individual text characters such as blink, underline, color and background, as well as the number of screen columns.

CC3WORD is a simple, single-screen, word processor with which you can fill the screen with text. You can even save it and print it, but its intent is to demonstrate how to effectively use the 40- and 80-column text modes.

CC2TOCC3 converts graphics and text to CoCo 3 format. This utility assists in making this conversion, although it won't take care of everything and only works on disk.

CIRCLES is a palette registers demo. This utility lets you display your choice of 64 different colors, 16 at a time, on either an RGB or Composite monitor.

SPINBALL is a utility that lets you create a ball that appears to be spinning by changing the palette registers color.

All of these programs are useful to CoCo 3 users and especially for those who want to develop programming skills.

(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $24.95 plus $3 S/H)

— David Gerald

LOTZALUK
IS HERE!

LOTZALUK, machine language program for COCO 1, 2,& 3. Studies history of LOTTO game as a handicapper studies horses. Arizona 6/39, California 6/49, Iowa 6/36, Missouri 6/39, New York 6/40, New York 6/48, Oregon 6/42, Tri-State (Maine, New Hampshire, & Vermont) 6/36, & Washington State 6/44 available. Others to follow. Requires 64K. Specify game desired with order.

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Gridiron Strategy Scores a Touchdown

For all you CoCo nuts who are football fans, SPORTSware has come out with a Hi-Res football game that will ease the withdrawal pains that come with the Super Bowl each season.

Gridiron comes in an attractive, hard-cover folder with program disk (not copy-protected), two Offense/Defense cards, two Defense selectors, and an 11-page manual. System requirements are a CoCo 3, one disk drive and a color monitor. I tried it on both RGB and composite color monitors. The graphics were great on the RGB and fair on composite. The author said he intends to put an RGB or composite option in the release version.

The manual is well-organized and well-written and will probably be needed only about 10 minutes, as the game just about runs itself. The only criticism of any importance is that it doesn't stress, or even mention for that matter, the importance of backing up the program disk.

The game is written in machine language so after a `LOADM` and `EXEC`, it takes about 30 seconds to load and give you the game screen. This consists of a scoreboard at the top, showing the team names, timeouts remaining, score, quarter, down, yards to go for a first down, yardline the ball is on, and time left in quarter.

> ***"With more than 20 offensive plays and 10 defensive plays, there are 200-plus possibilities."***

In the center of the screen is an overhead view of the football field, and on the bottom is an information window that shows the last offensive and defensive plays used and tells how much the play gained or lost. There is also a message window that comes down over the field itself that asks for prompts, tells you when you made a touchdown, scored an extra point or had a pass intercepted.

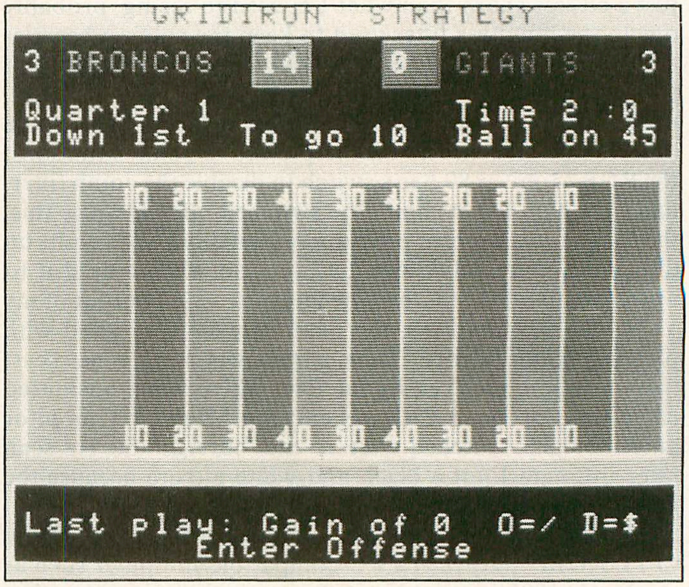
You are first given the opportunity to change the name of the teams; next, to change the default time (15 minutes) of a quarter. This is all prompted by the program and, again, almost runs itself. Next, you get to call the coin flip to see who kicks and who receives. This was the only bug I could find in this program; it always came up "heads"! The author says this has been fixed.

Once the preliminaries are over, the kicking team is given the choice of a regular or onside kick. The computer does a simulated dice roll (shown graphically and based on football statistics) and you have the field in front of you with the ball marked, the 10-yard marker on your screen in your team color, and a drive marker that extends if you have a sustained march.

Now the competition begins. Each player has a card with offensive plays on one side and defensive plays on the other. Each selects what he feels appropriate to the situation. The defensive player must signal — via a defense-ready marker — that the offense can enter his play in the computer. The defense then enters the play he has picked as shown when he turns his marker over. Neither team knows what the other one is going to do ahead of time.

The computer moves the ball marker, changes the down, changes the yards to go for first down, changes the clock, and changes the possession if it was a fourth-down attempt.

At the end of each half, you are given a two-minute warning. You are also given a screen print of halftime and end game statistics, the latter after the fourth quarter.



```
GRIDIRON  STRATEGY
3 BRONCOS  14   0  GIANTS   3
Quarter 1          Time 2 :0
Down 1st   To go 10  Ball on 45
```

```
Last play: Gain of 0  O=/ D=$
        Enter Offense
```

The heart of the strategy are the play cards. Each card has 20 offensive plays plus punt and field goal on one side and 10 defensive plays on the other. The offensive plays are diagramed, categorized by runs, short passes, medium passes and long passes. They are also grouped to show average gain per play. The defensive alignments are just as thoroughly documented. Each defense is rated for its success against the type of play anticipated. This sounds complicated, but isn't.

There is very little randomness in this game. That is to say, if you run up the middle against a defense that's set to stop a run up the middle, you aren't going to gain much yardage. But the important thing to keep in mind is that with more than 20 offensive plays and 10 defensive plays, there are 200-plus possibilities. There are also penalties, interceptions and timeouts that give this game a real football feel.

This is not a shoot-'em-up, fast fingers, joystick-type game. The program waits for the players rather than the other way around. There are sound effects, but they do not slow the play. The error protection is flawless. Good use is made of the CoCo 3's graphics. The game is not played in real time, but the author has done a clever job of accounting for time and timeouts.

In summary, this is an excellent game. After three weeks with it, I still find it fascinating. If you have your CoCo 3 connected to an old TV or composite color monitor with a bad picture, I would stay away from it, unless the issue version has a menu option for RGB or composite. Other than that, I give *Gridiron* a very high recommendation.

(SPORTSware, 1251 S. Reynolds Rd., Suite 414, Toledo, OH 43615; 419-389-1515, $29.95)

— Frank Mardon

Book Review

Tap Into *Better Graphics on Your CoCo 3*

Most would agree that one of the most important aspects of the Color Computer 3 is its enhanced graphics capabilities. Now, Moreton Bay has introduced *Better Graphics on Your CoCo 3*, a book designed to let you tap into these wonderful graphics abilities.

Better Graphics on Your CoCo 3, or *Better Graphics* for short, is a 43-page, staple-bound manual chock full of information nearly anyone can use as they learn about their new machine. It offers five major sections, each detailing certain aspects of graphics operation on the CoCo 3.

The first section, Memory Organization and Management, discusses at some length just how memory is allotted in the Color Computer 3. It is good to see that the author, Linda Nielsen, chose to discuss such an important subject first. Manipulation of graphics does require a working knowledge of memory organization.

The second section offers some information about the binary number system and discusses how graphics memory is translated into a usable onscreen image. It also gives detailed information on the assorted graphics modes available on the CoCo 3.

The third section of *Better Graphics* shows the reader how to use the various graphics modes and also how to create text on the high resolution screens. This section, along with the first section, would be suggested reading for any CoCo 3 owner.

The fourth section covers animation and scrolling techniques, while the fifth section pulls everything out of the hat and gives you detailed information on using your CoCo 3 in ways BASIC never heard of.

Now, lest you think you might have to type in numerous examples, Moreton Bay includes two disks with all programs on them. In my opinion, this complete package approach really enhances the educational value of *Better Graphics*. After all, if you have to spend your time typing in example programs, it can be quite difficult to follow and comprehend the principles the book is trying to teach.

Certain parts of the book may be more than some people can understand. The book is intended for those people who want to program, especially with graphics. However, the book takes the chore out of understanding graphics and memory utilization on the CoCo 3. With few minor exceptions, all points are clearly presented and anyone with a basic working knowledge of Color Computer programming should be able to follow it with little or no problem. *Better Graphics on Your CoCo 3* should be a part of everyone's library.

(Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101; 805-962-3127, $24.95)

— Cray Augsburg

Software Review

A Second Look at *Telewriter-64* and Friends

By Jerry Semones

(This program [June 1983] and its patches have been reviewed in previous issues of THE RAINBOW, *but we're taking this "second look" for the benefit of new readers.)*

I remember about 10 years ago when I first heard the term "word processor." At first it seemed odd that anyone would want to use a computer to write letters, articles or reports instead of a typewriter. But the more I read of and watched this new writing technique, the more its many advantages became obvious.

The rest is history. Just about everyone has some idea of what a word processor does even if they have never used one. This is due largely to the computer revolution that we are all participating in, as well as the vast usage of word processing in the work place.

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should consider word processing in general and *Telewriter-64* in particular. I suggest *TW-64* not only because I use it, but also because of the obvious popularity I see in the many submissions to THE RAINBOW prepared with *TW-64*.

TW-64 comes in either disk or tape versions and will run on any CoCo with as little as 16K of RAM. Since it automatically configures itself to your computer's memory size, your text buffer will grow as you add memory. (By the way, it runs fine on the CoCo 3.)

The user can select any one of three different screen formats. The screen "wakes up" in the standard 51-column by 24-line mode, but 64-by-24 and 85-by-24 are available, as well. The 51-column and 64-column are easily read on a composite monitor or a good quality TV set, but the 85-column mode is only good to see the overall layout of your printed page. I use the 51-column mode exclusively and select 65 characters per line when I send the text to the printer. This results in a nice looking letter or other printed text.

The user's manual that comes with *TW-64* is very detailed and complete in every way, with dozens of examples of what the various functions do.

Since *TW-64* is a screen editor, all of the data or text is always present and can be scrolled up or down on the screen. This is done using the arrow keys. If you type a sentence and make a mistake, you can simply move the cursor to the mistake and type in the correction. *TW-64* is somewhat different in this regard, in that it defaults to the Insert mode rather than the Overstrike mode. This means that the key depressed at the cursor will *add* the character rather than replace it.

While this may sound a little confusing, and takes a little bit of getting used to, I love it. In the Insert mode you will never lose text by inadvertent keystrokes. Besides, you can select the Overstrike mode if you prefer with a simple keystroke.

TW-64 features three menu screens. The first allows you to select either the Edit mode or a Newfile mode, which erases your text if selected. A counter keeps track of the number of words you have typed, as well as the number of lines. You can also select either cassette or disk I/O as well as the second Format menu.

The Format menu is used in conjunction with your printer. Here you can select line spacing, margins, lines per page, printer baud rate and queue, as well as right justify. You can even select where you want the page number to appear at the bottom of the page. Also supported is a percent print function, which allows you to print just the part of the text that you select to your printer.

The third menu screen is for disk I/O. This handles all of the disk read and write functions. It offers the same options as for cassette I/O, except for the Verify command. In the disk I/O menu, you can also see the disk directory files on the screen or send them to your printer. Here you can also save, kill or rename disk files without having to go back to BASIC.

TW-64 also supports the use of embedded commands in your text. This allows you to perform font changes, underlining, double-strike, etc., if your printer has the capability. You can also use these codes to flush text to the left while maintaining pre-defined columns.

There are far more features than space allows me to go into here, but the ability to align, scroll and copy blocks of text, and do easy searches for specified words, makes it a real workhorse of a program. *TW-64* is a full-blown word processor offering virtually all of the features you would expect to find in a word processor used on far more expensive machines than the CoCo. It's available for $49.95 on cassette or $59.95 on disk, plus $2 S/H, from Cognitec, 704 Nob Street, DelMar, CA 92041, or you can order it from your local Radio Shack Store.

But Wait — There's More

Telepatch II with *The Wizard* are two fine *TW-64* enhancements available from Spectrum Projects. *Telepatch II* provides the user with the ability to configure *TW-64* so that the disk I/O is RAM-resident. This is a big improvement, in that the disk I/O is instant since the program does not have to be accessed from the *TW-64* disk. The only disadvantage to this is that about 4K of text buffer space is sacrificed. A buffered keyboard is added with *Telepatch II*. Since I am not a super fast typist, I never really noticed that such a buffer was needed, but I did notice that, every now and then, *TW-64* would drop a character during the Insert mode. This bug has been fixed with *Telepatch II*. The new keyboard routine remembers what characters have been typed regardless of speed.

The main menu of *TW-64* with *Telepatch II* contains obvious changes, the most notable being that the cassette I/O functions are no longer visible. They are fully functional, however, should you need to use them. This was done to reduce screen clutter and confusion with the corresponding disk I/O functions, since *Telepatch II* will only work on a disk system. Other features such as auto-key repeat, key click, visible carriage returns, overstrike mode and disk drive stepping rate can be configured in the boot program to the default of your choice.

The Wizard, contained on the *Telepatch II* disk, is a nicely done, revised *TW-64* character set. While the new characters only appear on your screen, they are a big improvement. The new characters are gently curled and incorporate true descenders. The text is very easy to read and pleasing to the eye.

Ultra Telepatch, available from Bob van der Poel Software, is one of the best enhancements available for *TW-64*. This ultra version stores the disk I/O in RAM with no loss of buffer space. Word delete is added, so you can delete entire words instead of just one character at a time.

The boot program can be tailored to your needs with disk drive stepping rate, key clicks, on/off and reset protection. What I like best about *Ultra Telepatch II* is that the text automatically unfolds on the screen as soon as it is read into the buffer from disk. *Ultra Telepatch II* needs 64K of RAM and disk.

Telewriter-64 with *Telepatch II* and *Ultra Telepatch* offer the CoCo user all that will ever be needed for serious word processing.

(*Telewriter-64*, Cognitec, 704 Nob Street, Del Mar, CA 92041; 619-755-1258, Disk, $59.95; Tape, $49.95. *Telepatch II* with *The Wizard*, Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; 718-835-1344; $29.95. *Ultra Telepatch*, Bob van der Poel, 1734 57th Avenue, Edmonton, Alberta, Canada T6M 1E1; $19.95)

Sugar Software

NEW ☞ **OS9 PATCHER** ☜ - (C) This is a useful utility for your OS9 Level I or II system. It allows you to modify the contents of a file or memory module using easy to understand commands. Data may be displayed and entered in either decimal, hexadecimal, octal or ascii characters. Module CRCs calculated and patched automatically. Patch command files may be used as input to the Patcher and patch command files can be generated from an original and already patched file. Disk only; OS9 Level I or II; **$19.95**.

CALLIGRAPHER

CoCo Calligrapher - (Hybrid BASIC/ML) Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes 3 fonts: *Gay Nineties, Old English* and *Cartoon.* The letters are ½ inch high and variably spaced. Works with many printers including Epson, Gemini, Radio Shack, Okidata 92A, Banana and Prowriter. Additional fonts are available (see below). Tape/Disk; $24.95.

OS9 Calligrapher - (C) Although a different program from the CoCo Calligrapher, the OS9 Calligrapher prints all the same fonts. It reads a standard text file which contains text and formatting directives. You may specify the font to use, change fonts at any time, centering left, right or full justification, line fill, margin, line width, page size, page break and indentation. Similar to *troff* on UNIXTM systems. Includes Gay Nineties, Old English and Cartoon fonts. Additional fonts are available (see below). Disk only; OS9 Level I or II; **$24.95**.

Calligrapher Fonts - Requires Calligrapher above. Each set on tape or disk; specify RSDOS or OS9 version; **$14.95** each. **Set #1** - (9 fonts) Reduced, reversed and reduced-reversed versions of Gay Nineties, Old English and Cartoon; **Set #2** - (8 fonts) Old Style and Broadway; **Set #3** - (8 fonts) Antique and Business; **Set #4** - (8 fonts) Wild West and Checkers; **Set #5** - (10 fonts) Stars, Hebrew and Victorian; **Set #6** - (8 fonts) Block and Computer;

Economy Font Packages on disk; specify RSDOS or OS9; **29.95**: **Font Package #1** - Above font sets 1, 2 and 3 (25 fonts) on one disk. **Font Package #2** - Above font sets 4, 5 and 6 (26 fonts) on one disk. Both Packages #1 and #2 (51 fonts) on one disk; **49.95.** ☜ NEW

NEW ☞ **Calligrapher Combo** Package - *Everything!*; specify RSDOS or OS9; Includes the Calligrapher and both Font Packages on one disk; **$69.95.**

UTILITIES

Piratector - (100% ML) Utility to allow your own *disk-based* BASIC or ML programs to display a graphics title screen and then self-start after loading. Adds copy protection to your programs but still allows users to create *non-executable* backups! Includes Semigraf. Disk only; CoCo 1, 2, 3 (except Semigraf); $39.95.

Super Screen Machine - (100% ML) Put your CoCo into high resolution mode for your own BASIC or ML programs. Smooth scroll, key click, lower case with colored characters. Tape/Disk; 32K CB; CoCo 1, 2, 3 (except 64K mode); $19.95.

Color Disk Manager - (100% ML) Disk utility with these features: Disk repair, selective track initialization, verify sectors, backups, tape to disk transfer, ROM Pak execution from disk, much more! Tape/Disk; CoCo 1, 2, 3 (except for 64K mode); **$24.95**.

Color Tape Manager - (100% ML) Tape utility with these features: display start, end and exec address of ML programs, convert ML programs into BASIC *DATA* statements, append ML to BASIC, load, display/modify and save tape file, handles missing EOF and filename blocks, much more! Tape/Disk; 16K ECB; CoCo 1, 2, 3 (except for 64K mode); **$19.95**.

INFORMATION MGT.

TIMS (The Information Management System) - (Hybrid BASIC/ML) Tape or disk, fast and simple general data base program. Create *files* of *records* that can be quickly sorted, searched, deleted and updated. Powerful printer formatting. Up to 8 *user* fields, sort on up to 3 fields. Tape/Disk; $19.95 (see combo pkg below).

TIMS Mail - (Hybrid BASIC/ML) Tape or Disk based mailing list management program. Files are compatible with TIMS. Fast and simple to use. Supports labels 1, 2 or 3 across, 2½ to 4 inches wide. Tape/Disk; $19.95 (see combo pkg below).

TIMS Utility - (Hybrid BASIC/ML) Utility companion for TIMS and TIMS Mail to allow multi-term search (*AND* and *OR* logic), global change and delete, split large files and more! Tape/Disk; $14.95 (see combo pkg below).

TIMS Combo Package - All three of the above programs: TIMS, TIMS Mail and TIMS Utility on one disk - **$34.95**.

SPORTS STATISTICS

Statistics programs for the coach, team manager or avid fan who wants to keep accurate team and opponent records. Printer output supported. The following are available: Baseball, Basketball, Football and Soccer. Disk only; $19.95 each.

EDUCATIONAL

NEW ☞ **Trig Attack** - (100% ML) In this educational arcade game, enemy *trigs* travel along math curves. Players learn important mathematical concepts as they play. Trig Attack is filled with sound effects, colorful graphics and features 11 challenging levels. First class mathematical entertainment for ages 9 and up. Excellent manual includes an introduction to trigonometry. Tape 16K CB/Disk 32K ECB; CoCo 1, 2, 3; **$19.95**.

A complete catalog of other sweet Sugar Software products is available.

Silly Syntax - (Hybrid BASIC/ML) Ages 5 and up. Story creation game; output to screen or printer; includes 2 stories or create your own. Tape/Disk; **$19.95** or disk with 62 stories for **$29.95**. Sets of 10 stories on tape/disk for **$4.95**: Fairy Tales, Current Events, X-Rated, Sing-Along, Adventure, Potpourri.

Bible Stories Adventure - (Hybrid BASIC/ML) Ages 4 & up. A graphics adventure game for young children & their families. Old testament. Tape/Disk; $19.95.

The Presidents of the USA - (100% ML) Ages 10 and up. Two trivia games, user modifiable, printer output supported. Tape/Disk; 16K ECB; **$19.95**.

The Great USA - Ages 9 and up. Trivia game of the 50 states. Capitals, nicknames, abbreviations, flowers, trees and birds. Tape/Disk; 16K ECB; **$19.95**.

Galactic Hangman - Ages 7 and up. Exciting new twist to the popular word game. Outstanding graphics; 700 word vocabulary. Tape/Disk; 16K ECB; **$19.95**.

PreReader - (Hybrid BASIC/ML) Ages 3-5 (level I); Ages 5-7 (level 2); Great graphics and music. Level 1: match colors, shapes, letters and numbers; Level 2: match letters and consonant blends with their sounds. Tape/Disk; Joystick; **$19.95**.

Statgraf - High school and college level; Linear regression analysis program combined with a plotting and line graphing system. Up to 250 x/y pairs; data transformation; residuals; regression line; print graph with screen print program (not supplied); Tape/Disk; **$19.95**.

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CoCo Knitter - Easy to use program to display or print instructions to knit a sweater: Cardigan or Pullover; Round or V-neck; Raglan or Set-in Sleeve; 3 weights or yarn; 8 sizes from baby to man. Tape/Disk; **$19.95**.

Flying Tigers - (100% ML) Fast *Defenders* style arcade game. 5 levels of difficulty; Outstanding graphics and sound effects. Tape/Disk; Joystick; **$19.95**.

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* * *

Clubs, Clubs, Clubs

We compile a list quarterly of Color Computer Clubs because of the many requests we receive. CoCo Clubs may wish to exchange newsletters, share ideas for topics of discussion at monthly meetings, etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs that have signed our anti-piracy agreement form will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

CoCo Clubs
THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

— **Karen Semones**

ARIZONA

Tucson Color Computer Club, Bill Nunn, 9631 E. Stella, Tucson, 85730, (602) 721-1085

CALIFORNIA

Color America Users Group, Mark Randall, 2227 Canyon Road, Arcadia, 91006, (818) 355-6111

Los Angeles-Wilshire Color Computer Users' Group, Norm Wolfe, P.O. Box 11151, Beverly Hills, 90213, (213) 838-4293

United Computer Federation, (San Fernando Valley Chapter and Headquarters), Pete Ellison, 366 West Providencia Ave., Burbank, 91506, (818) 840-8902

United Computer Federation, (San Francisco Chapter), Art Murray, P.O. Box 7007, Redwood City, 94063, (415) 366-4560, BBS (415) 364-2658

United Computer Federation, (Los Angeles Chapter), Gary James, 4147 Faculty Avenue, Long Beach, 90808

United Computer Federation, (Orange County Chapter), Fred Wright, 10112 Melody Park Drive, Garden Grove, 92640

The Davis CoCoNuts, Shneor Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195

South Bay Users Group (S-Bug), Patricia Scheffer, P.O. Box 653, Hawthorne, 90251, (213) 532-8071

South Bay Color Computer Club, Bill Tillerson, 73 Alamitos Ave., Suite 2, Long Beach, 90802, (213) 432-3037

Ventura County Color Computer Club (VC4), Doug McLaughlin, Oxnard Public Library, 214 South "C" Street, Oxnard, 93030, (805) 984-4636 or BBS (805) 484-5491

Citrus Color Computer Club, Jack Brinker, P.O. Box 6991, San Bernadino, 92412, (714) 824-1866

South Bay Color Computer Users Group, John G. Say, 3117 Balmoral Drive, San Jose, 95132, (408) 923-2967

COLORADO

Colorado Color Computer Club, Lloyd Carroll, 6651 Bellaire Street, Commerce City, 80022, (303) 288-6369

The ESCO Computer Club, David E. Schulz, 1299 Harrison Street, Denver, 80206, (303) 388-6988

CONNECTICUT

The Southeast Connecticut Color Computer Users Group, Bill Gross, 30 Sycamore Lane, Groton, 06340, (203) 448-1388

DISTRICT OF COLUMBIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, Virginia 22193, (703) 690-2453

FLORIDA

Color Computer Club of Brandon, Richard Steinbrueck, 2913 John Moore Road, Brandon, 33511, (813) 681-1526

Northwest Florida CoCo Nuts, Lee Gottcher, P.O. Box 1032, Fort Walton Beach, 32549, (904) 678-8894

Alachua County Color Computer Club, Robert J. Lake, 2929 N.E. 12th Street, Gainesville, 32609, (904) 378-1993

Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216, (904) 721-0282

CoCo Chips Color Computer Club, 715 5th Avenue NE, Largo, 33540, (813) 581-7779

Broward County Color Computer Club, George Aloia, 2263 N.W. 65 Avenue, Margate, 33063, (305) 972-0975

South Brevard Color Computer Club, Benjamin S. Jerome, 496 Hillside Court, Melbourne, 32935, (305) 259-4609

CoCo Nuts of Central Florida, George Ellenburg, Box 593790, Orlando, 32859-3790, (305) 855-7867

Color-6809 Users Group, Emery Mandel, 4301 11th Avenue North, St. Petersburg, 33713-5207, (813) 323-3570, BBS (813) 321-0397

C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33583, (813) 921-7510

GEORGIA

The Northeast Atlanta Color Computer Club, Joe Novosel, P.O. Box 450915, Atlanta, 30345, (404) 921-7418

The CoCo Cartel, Dennis M. Weldy, 4059 Acacia Drive, Columbus, 31904, (404) 576-5479

Atlanta Color Computer Users Group, Terry E. Love, 5155 Maroney Mill Rd., Douglasville, 30134, (404) 949-5356

ILLINOIS

Illinois Color Computer Club of Elgin, Tony Podraza, 119 Adobe Circle, Carpentersville, 60110, (312) 428-3576

Northern Illinois Color Computer Club, Kenneth Trenchard, Sr., 6145 N. Sheridan Road 30, Chicago, 60660, (312) 973-5208

Willow-Works Club, Kevin L. Adair, 5753 S. Laflin, Chicago, 60636, (312) 737-5716

Peoria Color Computer Club, R.E. Garvie, 1346 Georgeanne, Pekin, 61554, (309) 347-8653

Glenside Color Computer Club, Ed Hathaway, 8 W. Stevenson Drive, Glendale Heights, 60139, (312) 462-0694

Kitchen Table Color Computer Group, Robert Mills, P.O. Box 464, Hanover, 61041, (815) 591-3377

Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044

Chicago OS-9 Users Group, John Chasteen, 480 Gilbert Drive, Wood Dale, 60191, (312) 860-2580

INDIANA

Three Rivers Color Computer Club, R.R. 3, Box 269, Angola, 46703

CoCo Program Exchange, Erik Merz, 3307 Arrow Wood Dr., Fort Wayne, 46815, (219) 749-0294

Indy Color Computer Club, Kevin S. Jessup, Sr., P.O. Box 26521, Indianapolis, 46236, (317) 873-5808

Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

IOWA

CoCo Questers, Scott Bellman, 2420 Salem Court, Bettendorf, 52722, (319) 359-7702

Metro Area Color Computer Club (MACCC), David E. Hansen, 3147 Avenue J, Council Bluffs, 51501, (712) 323-7867

Mid Iowa CoCo, Terry G. Simons, 1328 48th Street, Des Moines, 50311, (515) 279-2576

Dubuque Tandy Users Group, Wesley Kullhem, 1995 Lombard, Dubuque, 52001, (319) 556-4137

KANSAS

Hutchinson Color Computer Club, James M. Jones, 612 Idlewild, Hutchinson, 67502, (316) 662-0718

KC CoCo Club, Gay Crawford, P.O. Box 11192, Kansas City, 66111, (913) 764-9413

Micro 80 Users Group, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353

Color Computer Club of Wichita, David Brimmer, 527 N. Pershing Ave., Wichita, 67208, (316) 685-9587

KENTUCKY

Perry County CoCo Users Group, Keith W. Smith, General Delivery, Hardburly, 41747, (606) 439-4209

LOCO-COCO, Jim Spillman, 2405 Woodmont Dr., Louisville, 40220, (502) 454-5331

The Basic Byte, Don Henderson, 152 Patty Lane, Florence, 41042, (606) 371-9368

LOUISIANA

Cajun CoCo Club, Rick Herbert, P.O. Box 671, Crowley, 70526, (318) 788-3148

The CoCo Sig, Christopher Mayeux, 20 Gibbs Drive, Chalmette, 70043, (504) 277-6880

MAINE

Western Maine Color Computer Club, Michael Wewell, Box 780, Bethel, 04217

Tandy Computer Club, Delmer Cargill, P.O. Box 428, Westbrook, 04092, (207) 854-2862

MARYLAND

Arkade, John M. Beck, 3513 Terrace Drive #D, Suitland, 20746, (301) 423-8418

MASSACHUSETTS

Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803

Massachusetts CoCo Club, Jason Rahaim, Spring St., Lunenberg, 01462, (617) 582-6514

CLUB 6809, Jean Salvas, 204 East Street, Springfield, 01104, (413) 734-5163

MICHIGAN

Color C.H.I.P.S., Jack Pieron, 3175 Oakhill Place, Clarkston, 48016, (313) 627-4358

Tandy Users Group of Grand Rapids, Robert M. Worth, Jr., 1726 Millbank S.E., Grand Rapids, 49508 (616) 245-9324

Greater Kalamazoo Color Computer Club, Jim Rix, 1835 Chevy Chase Blvd., Kalamazoo, 49008, (616) 344-7631

Greater Lansing Color Computer Users Group, P.O. Box 14114, Lansing, 48901

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

Color Computer Owners Group, Charles Van Ark, c/o OSL Computer Products, Inc., 4950 Shaefer, Dearborn, 48126, (313) 582-8930

MISSISSIPPI

Singing River C.C. Club, Mark Welch, 3605 Vancleave Rd., # 118, Gautier, 39553, BBS (601) 875-8688

Gulf Coast Color Computer Assoc., Ed Keels, 22 Christy Cove, Gulfport, 39503, (601) 832-1210

Jackson Color Computer Club, Dorothy N. Welch, 424 Church Street, Madison, 39110, (601) 856-7255

CoCo Art Club, Joel Bunyard, Rt. 16, Box 11, Meridian, 39301, (601) 483-0424

MISSOURI

North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078

Mid-America Color Computer User's Group, Jerry Morgon, 807 Ponca Drive, Independence, 64056, (816) 796-5813

Coconuts, Steve Knittel 1610 N. Marlan, Springfield, 65803, (417) 485-3419

Mako TRS-80 & Tandy Users Group, David Morgan, 622 Porter, Joplin, 64801, (417) 781-6546

NEBRASKA

Siouxland Color Computer Club, Alan Pedersen, 611 D Street, South Sioux City, 68776, (402) 494-2284

NEVADA

C.A.T. F.U.N., Paul A. Osborne, 201 Miners Road, Fallon, 89406, (702) 423-5789

NEW JERSEY

West Orange CoCo Club, Gregg Favalora, 12 Blackburne Terrace, W. Orange, 07052, (201) 736-1748 (let ring 12 times)

Loco CoCo Club, Bud Lavin, 73B Wavercrest Ave., Winfield Park, 07036

Mercer County Color Computer Users Group, Richard C. Kelly, 1904 Country Lane, W. Trenton, 08628, (609) 883-9270

NEW MEXICO

Chaves County Color Computer Club, Harry Machen, 18 Forest Drive, Roswell, 88201,

The Curry County CoCo Club, Ron Bull, 100 Conestoga Trail, Clovis, 88101, (505) 763-4713

NEW YORK

Adirondack CoCo Club (Albany Chapter), Ron Fish, Box 4125, Albany, 12204, (518) 465-9793

Adirondack CoCo Club, (Greene County Chapter), Pete Chast, P.O. Box 61, Athens, 12015, (518) 945-1636

Adirondack CoCo Club (Glens Falls Chapter), Richard Mitchell, 39 Center St., Fort Edwards, 12828

The Island Color Computer Club, DK. Lee, P.O. Box 426, Massapequa Park, 11762, BBS (516) 227-1285

Kings Byte CoCo Club, Morty Libowitz, 1063 East 84th St., Brooklyn, 11236, (718) 763-4233, BBS (718) 837-2881

C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 13357, (315) 895-7730

Rockland County Color Computer Users Group, Harold L. Laroff, P.O. Box 131, Monsey, 10952-0131, (914) 425-2274

Olean Area CoCo Users Group, Herman L. Smith, P.O. Box 216, Olean, 14760, (716) 933-7488, BBS (716) 933-7489

The Rochester S-80 Computer Club, Inc., Gary Panepinto, P.O. Box 15476, Rochester, 14615, (716) 392-6133

New York Color Computer User Group, Carl Glovinsky, 15 Bolivar St., Staten Island, 10314, (718) 761-0268

Broome CoCo Club, Lloyd Shotwell, 18 Adaline Street, Owego, 13827, (607) 687-3231

NORTH CAROLINA

Bull City CoCo Users Group, Todd Wall, 5319 Durand Drive, Durham, 27703, (919) 598-1348

Raleigh Color Computer Club, David Roper, P.O. Box 680, Garner, 27529

OHIO

Central Ohio Color Computer Club, Jim Upperman, 5201 Wilcox Road, Amlin, 43002, (614) 876-1767

Color Computer Club, Inc., William Wills, P.O. Box 468, Canfield, 44406

Dayton Color Computer Users Group, Steven E. Lewis, 4230 Cordell Dr., Dayton, 45439, (513) 299-3060

Dayton Area Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45419, (513) 293-2228

Greater Toledo Color Computer Club, William Paul Saba Sr., 3423 Cragmoor Ave., Toledo, 43614, (419) 385-9004

Tri-County Computer Users Group, William J. Loeffler, 2612 Dale Avenue, Rocky River, 44116, (216) 356-0779

Miami Valley CoCo Club, Tim Ellis, 1805 W. Parkway Dr., Piqua, 45356, (513) 773-2244

OKLAHOMA

Central Oklahoma Computer Organization, Inc., Martin Schiel, 5313 Spitz Drive, Oklahoma City, 73135, (405) 670-6891

Green Country Computer Association, Michael Keller, P.O. Box 2431, Tulsa, 74101, (918) 245-3456 (DATA)

Central Oklahoma Computer Organization Inc., Enid Chapter, Jim Sands, 706 South Grand, Enid, 73701, (405) 237-5949

PENNSYLVANIA

SNUG-Phila., William K. Serody, 1181 Cumberland Road, Abington, 19001, (215) 887-0513

HUG-A-CoCo, George Lurie, 2012 Mill Plain Court, Harrisburg, 17110, (717) 657-2789

Penn-Jersey Color Computer Club, P.O. Box 2742, Lehigh Valley, 18001

Williamsport Area Color Computer Club, John M. Rymell, R.D. 3, Box 182, Muney, 17756, (717) 546-2721

The CoCo Exchange Club, Daniel Moore, 617 Prescott Avenue, Scranton, 18510, (717) 961-0535

Skyline Color Computer Club of Berks County, Lewis F. Brubaker, 4874 Eighth Ave., Temple, 19560, (215) 921-3616

Pittsburgh Color Group, Ralph Marting, 309 Frazier Dr., Pittsburgh, PA, 15235

Hollidaysburg CoCo Users Club, Shawn S. Senne, RD1 Box 77, Hollidaysburg, 16648, (814) 695-3522

The Hollidaysburg Area Color Computer Club, Bill Smith, P.O. Box 101, Roaring Spring, 16673, (814) 224-5280

RHODE ISLAND

New England COCONUTS, P.O. Box 28106, North Station, Providence, 02908

SOUTH CAROLINA

LoCo CoCo Club, Larry Coyle, 4334 Flynn Dr., Charleston, 29405, (803) 747-0802

Midlands 80 Computer Club, Frank Eargle, P.O. Box 7594, Columbia, 29202, TBBS (803) 791-7389

Spartanburg County CoCo Club, Lawrence Easler, Jr., Rt. 1 Highway 221, Spartanburg, 29302, (803) 578-3120

TENNESSEE

Tri-Cities Computer Club, Gary Collins, P.O. Box 4506 CRS, Johnson City, 37602-4506, (615) 929-1862

Foothills Micro-Computer Club, Aaron Sentell, P.O. Box 1541, Maryville, 37801, (615) 982-4629

Memphis Color Computer Users Group, Logan R. Ward, 5512 Poplar, Memphis, 38119, (901) 685-0009

TEXAS

Alamo Color Computer Club, P.O. Box 690256, San Antonio, 78269

UTAH

Salt City CoCo Club, Dennis Mott, 720 E. Browning Ave., Salt Lake City, 84105, (801) 487-6032, BBS (801) 487-6787

VIRGINIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, 22193, (703) 690-2453

Central Virginia Color Computer Club, Roger Lee, Rt. 2 Box 175, Madison Heights, 24572

Color Company, Rick Blouin, 12007-C3 Greywing Sq., Reston, 22091, (703) 860-9297

Richmond Area Color Computer Organization, William Mays, 6003 Westbourne Drive, Richmond, 23230, (804) 282-7778

WASHINGTON

Northwest Computer Club, Larry Haines, East 2924 Liberty, Spokane, 99207, (509) 483-5547

Mount Rainier Color Computer Club, Ron Amos, 2450 Lenore Drive N., Tacoma, 98406, (206) 752-8735

Tri-Cities Color Computer Users' Group/OS-9 SIG, Jim Vestal, P.O. Box 1213, Richland, 99352, (509) 943-4832

WEST VIRGINIA

Mil-O-Bar Computer Club, Jim LeMaster, P.O. Box 130, Ona, 25545, (304) 743-4752 after 4 p.m.

Blennerhassett CoCo Club, David Greathouse, 1306 Wells Circle, Parkersburg, 26101

WISCONSIN

Southern Wisconsin CoCo Club, David C. Buehn, 24607 67th Street, Salem, 53168, (414) 843-3830

CANADA

ALBERTA

Bonnyville User Group (BUG's), Doug MacDonald, Box 2071, Bonnyville, Alberta, T0A 0L0, (403) 826-4790

The Calgary Color Computer Club, P.O. Box 22, Station M, Calgary, Alberta, T2P 2G5

Edmonton CoCo Users Group, Dexter Dombro, P.O. Box 4507 Stn. South, Edmonton, Alberta, T6E 4T7, (403) 439-5245

BRITISH COLUMBIA

Vancouver Colour Computer Club, Box 76734, Stn S, Vancouver, British Columbia, V5R 5S7

Salmon Arm CoCo, *David Coldwell*, *RR #4*, Site 26 Comp. 13, Salmon Arm, British Columbia, V1E 4M4

MANITOBA

Winnipeg Micro-80 Users Group, Robert Black, 1755 King Edward St., Winnipeg, Manitoba, R2R 0M3, (204) 633-7196

NEW BRUNSWICK

Campbellton 6809E Users Group, Blaine Arsenault, 80 Deny Street, Atholville, New Brunswick, E0K 1A0, (506) 753-4769

Moncton Color Computer Users Group, Robert E. McLaughlin, 73 Lewis Street, Moncton, New Brunswick, E1C 4S5, (506) 855-3860

NOVA SCOTIA

Color Trading Post, Lee A. Sutton, P.O. Box 565, Bridgetown, Nova Scotia, B0S 1C0

Halifax Dartmouth CoCo Users Group, Eugene Naugler, P.O. Box 572, Nova Scotia, Dartmouth, B2Y 3Y9

Colour Computer Halifax User Group (CoCo Hug), Paul A. Power, 6354 London St., Halifax, Nova Scotia, B3L 1X3, (902) 455-6341

ONTARIO

ESSA Color Computer Club, David Morrow, 10 Berwick Cres., Angus, Ontario, L0M 1B0, (705) 424-6985

Kingston CoCo Club, Kenneth Bracey, 316 Westdale Ave., Apt. 4-C, Kingston, Ontario, K7L 4S7, (613) 544-2806

K-W CoCo Club, P.O. Box 1291, Station C, Kitchener, Ontario, N2G 4G8

London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, Ontario, N6G 3H8, (519) 472-7706

Niagara Regional CoCo Club, Gerry Chamberland, 6843 Cumberland Crt., Niagara Falls, Ontario L2H 2J9, (416) 357-3462

Ottawa 6809 Users Group, Norm Shoihet, 1497 Meadowbrook Road, Ottawa, Ontario, K1B 5J9, (613) 741-1763

Sarnia Computer Users Group, J. Verdon, P.O. Box 1082, Sarnia, Ontario, N7T 7K5, (519) 344-6985

Burlington Color Computer Users Group, Lawrence T.J. Coffey, 33 Drakes Drive, Stoney Creek, Ontario, L8E-4G4, (416) 573-6889

Durham 80-C Computer Club, Tony Kernohan, P.O. Box 95, Whitby, Ontario, L1N 5R7, (416) 728-6416

QUEBEC

Club d'Ordinateur Couleur du Quebec, Inc., Centre de Loisirs St-Mathieu, 7110- 8e Ave., St-Michel, Montreal, Quebec, H2A 3C4, (514) 729-8467

Club Micro Ordinateur de Montreal-Nord, Christian Champagne, 12365 Blv. Langelier #7, Montreal-Nord, Quebec, H1G 5X6, (514) 323-5958

Les CoCophiles, Robert Chartrand, 17 Bord-de-l'eau, Repentieny, Quebec, J6A 3K2, (514) 581-1385

Club ORCO-RS, Jacques Bedard, 33 Lisiere, St-Constant, Quebec, J0L 1X0, (514) 632-4311

Le Club Couleur du Nord, Gabriel Pigeon, C.P. 315, Barraute, Quebec, J0Y 1A0, (819) 734-2577

Club CoCo APPE, Andre Patenaude, 10870 Bois de Boulogne, Montreal, Quebec, H3M 2X1, (514) 331-8418

Advanced Montreal CoCo Club, Richmond Skrzzy-pinski, 329 boul. Richelieu, St-Basile-le-Grand, Quebec, J0L 1S0, (514) 653-5182

SASKATCHEWAN

Saskatoon Color Computer Club, L. Curtis Boyle, 35 Bence Crescent, Saskatoon, Saskatchewan, S7L 4H9, (306) 382-1459, BBS (306) 384-8040

FOREIGN

ARGENTINA

Freecoco Club, Novoa, Miguel Angel-Ing. Duarte, Omar, Mendez de Andes 799, Buenos Aires, Capital Federal 1405, Argentina, phone 431-2501

AUSTRALIA

Blacktown City TRS-80 Colour Computer Users Group, Keith Gallagher, P.O. Box 264, Riverstone, New South Wales, 2765, Australia, (02) 627-4624

COCOPUG, Harry Murphy, 8 Lois Court, Regentsville, New South Wales, Australia, 2750

CoCoHUG (Color Computer Hobart Users Group), Robert Delbourgo, 15 Willowdene Avenue, Sandy Bay, Hobart, Tasmania, Australia 7005

Sunshine Color Computer Club, Stephen Jones, P.O. Box 111, Sunshine, Victoria, Australia, 3020

Australian Christian Users Group, Lieutenant Raymond L. Isaac, 57 Wittenoom Street, Collie, Western Australia 6225, phone (097) 34-1578

ISRAEL

The Mid-East CoCo Club, J. Yosef Krinsky, 526/11 Kiryat Kaminetz — Neve Yaacov, Jerusalem, Israel

MEXICO

Mexcoco Users Group, Sergio Waisser, Paseo de la Soledad #120, Mexico City, D.F., 53920, Mexico, phone 294-36-63

First Color Computer Users Group of Hermosillo, Arturo Fernandez Diaz-Gonzalez, Javier de Leon No. 708, Colonia Pitic, Hermosillo, Sonora, Mexico, phone 4-75-78

the NETHERLANDS

Color Computer Club Benelux, Jorgen te Giffel, Eikenlaan 1, 4641 GB Ossendrecht, the Netherlands

CoCoCE, J. Slaats, Chopinlaan 11, 5653 ET Eindhoven, the Netherlands, (040) 512222

PERU

Piura Color Computer Club, Carlos Alvarez, Box 142, AV. Guillermo Irazola, J-6 URB. Miraflores Castilla, Piura, Peru, phone (074) 327182

PUERTO RICO

Puerto Rico Color Computer Users Club, P.A. Torres, Cuernavaca 1699, Venus Gardens, Rio Piedras, Puerto Rico 00926, Phone (137) 755-7598

WEST GERMANY

First CoCo Club Hamburg, Theis Klauberg, 2345 Delaware Drive, Ann Arbor, MI 48103, West Germany *(temporary address)*.

The Greatest German CoCoCooks, Michael Herbes, Dorfstr 23, 4320 Hattinger, West Germany

new clubs

- The Color Computer Club Eindhoven meets every first and third Monday of the month from 7 to 11 p.m. at the Community Hall, 't SLOT, Kastelenplein 167, Eindhoven (suburb Gestel). One night deals with BASIC and the next with ML. We also discuss hardware. Call 040-512222 or write for information.

Jan Slaats
Chopinlaan 11
5653 ET Eindhoven
The Netherlands

- Tri-Cities Color Computer User's Group meets twice a month: The second Tuesday evening of each month is for all CoCo users, and the fourth Tuesday evening of each month is our new OS-9 SIG meeting. The CoCo club meets at Les Draper's Photo Classic Studio, 624 West Lewis, in Pasco, Washington. The OS-9 SIG meeting place is announced in our monthly newsletter, "The Tri-Cities CoCo Club News." Both meetings start at 7 p.m. There is no cost for membership except for the newsletter subscription, which costs $5 a year. Call Jim Vestal at (509) 943-4832 or you can write us.

Tri-Cities Color Computer User's Group
P.O. Box 1213
Richland, WA 99352

- We would like to inform your readers of a new CoCo newsletter being published called "Basic Byte." Please enclose an SASE when writing.

Don Henderson
152 Patty Lane
Florence, KY 41042

- Is there anyone in my area who would be willing to share public domain software or start a CoCo Club? If so, please write.

Daniel Thickins
102 Oakwood Avenue
Simcoe, Ontario
Canada N3Y 1H9

- We got it together! Clovis now has The Curry County CoCo Club. Check us out.

Bill Walker
7214B Carolina Loop
Clovis, NM 88101

- Advanced Montreal CoCo Club will have a monthly newsletter, contests with prizes worth over $30, even a subscription to RAINBOW. We welcome members from all countries.

Advanced Montreal CoCo Club
329 boul. Richelieu
St-Basile-le-Grand, Quebec
Canada, J0L 1S0

- Announcing the Club CoCo APPE in Montreal. For more information, call (514) 331-8418. You can also write us.

Andre Patenaude
10870 Bois-De-Boulogne
Montreal, Quebec
Canada, H3M 2X1

- The Burlington Color Computer Users Group meets at Burlington Central High School the second Tuesday of each month.

Lawrence Coffey
33 Drakes Drive
Stoney Creek, Ontario
Canada L8E 4G4

- CCOG would like to invite CoCo users or would-be users to join us. We meet on the third Tuesday of each month from 7-10 p.m. at DSL Computer Products, Inc., 4950 Schaefer, Dearborn, MI. We generally have some presentation and much informal exchange of information. Anyone interested can call me evenings at (313) 334-3934.

Charles S. Van Ark
Bloomfield Hills, MI

Hint. . .

Waiting for the Keystroke

If you want your BASIC program to wait for a keystroke, just type `EXEC 44539`. This performs the same function as `A$=INKEY$:IF A$="" THEN` (next line).

The computer waits for any key to be pressed before the program continues.

DRAW Statements: Getting the Picture

By Joseph Kolar
Rainbow Contributing Editor

This may well be the most difficult tutorial you will experience in this column. The `DRAW` statement, with all its nuances, is what CoCo employs to create nearly all of its best graphics. Thus, it is imperative to understand how to use `DRAW`. In the past, we have made many cute programs using it. In the future, we shall study it in more detail.

The `DRAW` statement is difficult to read and interpret from a listing. It makes little sense. But, when the `M` option is also thrown in for good measure, program lines make as much sense to the newcomer as Chinese.

As hard as it is to create a picture with `DRAW`, it is infinitely harder to dig into the program and make corrections and alterations.

Key in Listing 1. Here are a few procedural hints to aid you when you are extracting or injecting new or replacement characters into the `DRAW` program line.

When you locate the place you intend to modify, make a notation on scrap paper of the actual characters in that area. For example, type `LIST 200`. If you are planning to work at the very beginning of the line, write on the scrap paper, `U3NR3U3R4BR3`. Figure out your expected changes, for instance, `U4NR3U2R4`, and place them underneath your first notation. You then make your changes — in this example, change `U3` to `U4` and the next `U3` to `U2`. The reason for using scrap paper is that after you make the change, the result may be wrong or disappointing. You will want to know what your original data was so that you can restore it, especially if you have forgotten which data you replaced.

Whenever you are changing some characters in a program line, take a moment to insert a blank space in front of your target area and then insert a second blank space at the end of the work area. This way you will be able to locate your bracketed work area at a glance, and the included blank spaces remain harmless. After you are finished, you can leave the blank spaces in the program line, except in the unusual case where you have the maximum number of characters in a line. You may prefer to use the semicolon in place of blank spaces.

Keep in mind that every time you tinker with a `DRAW` statement, there is the danger that you might distort a segment somewhere down the line. You will have to be prepared to make further remedial corrections.

If you use the "continuous line" method, you will have to adjust the `B` option characters/values. Frequently, you will be able to make changes in the length of a straight line segment using the `N` option, avoiding the dislocation of some part of the program.

By "continuous line" method, I mean that (H,V), the horizontal and vertical starting location, is determined in the first `DRAW` line. It is not computed again, since no matter how many `DRAW` lines are used, they are merely a continuation of the previous line.

Relocating each succeeding `DRAW` program line is a big waste of time. Finding a new set of (H,V) values, after having traveled a tortuous route with perhaps 40 to 150 direction changes, is boring and time-consuming.

If you have a graph paper sketch to use as a guide, your job is half-finished. Otherwise, you may have to create a copy of the picture by plotting the information in the `DRAW` lines onto graph paper.

I never told you debugging was easy! (Notice that I have avoided the nasty word to keep you in a compliant mood.) Your graph paper rendition will be an exact reproduction of your program lines. It will be a great help in planning modifications. You will find it is so much easier to make corrections on graph paper with an eraser than to execute tentative, time-consuming changes in the program lines.

To give you an idea how difficult it is to rip apart `DRAW` program lines, Line 200 contains the printed legend, `FIGURE 1`. Suppose I wanted to make the `G` more pronounced. How would you locate it and revise it to make the hook higher up? Run, then type `LIST 200`.

First, you must discover the size, height and width of a letter and the width of the space between letters. The

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Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

simplest way is to get some graph paper (or make some homemade graph paper) and plot it out. Pick some line intersection on the graph paper and begin: Go up three units; go right three units and return three units left; go up three units; go right four units.

If you drew the lines correctly, an `F` appeared. By counting the line lengths, U3 + U3 = 6 and R4 = 4, we can infer that most of the letters will be six units high and four units wide.

`BR3` tells us we moved three spaces right but did not print a visible line. I call this the invisible line. Therefore, we can conclude that the space between letters is generally three units wide.

Now run. The legend doesn't remain on the screen long. You can hold it by pressing `SHIFT` and @ together. What we expect to do is make the small, vertical part of `G` one unit longer to make it stand out. That part was two units long. Depending on which way the two-unit line was drawn (downward or upward), it is either `D2` or `U2`. Press `BREAK` and type `LIST 200`. We look for a `U2` or `D2` further along in the program. We spot a `D2`. It is in about the right location. We edit it from `D2` to `D3` and run.

That wasn't it! We restore the original `D2` and run, then type `LIST 200`. But, it has to be it. If we came from above, we must have come down `BD4`. `D2` gives us the height of the visible line.

If we change `D2` to `D3`, then `BD4` must equal `BD3`. Type `EDIT 200` and locate `BD4`. Make your change. Continue to `D2` and change it, then run.

It is important that you think out your correction. Suppose I wanted to make the space between `E` and `1` one unit wider? Type `LIST 200`. We know the numeral `1` is the last character in the line. We know that three spaces separate each letter. Thus, we are looking for a `BR3` near the end of the program line. The nearest `BR3` is too far away, so we look for a `BR4` or `BR2`.

A `BR4` stands out. We will change it to `BR5` and see what happens. Run. Yep, that was it. The reason it was four units wide was that it looked better; now we know that five units wide is even nicer looking.

This legend was written in one continuous line. Some letters begin at the top and some at the bottom. Five programmers might create this line in five different variants. I am apt to proceed one way, and the next time I am creating the same character/number, I might strike off in another direction depending on whim. This is what makes revising `DRAW` lines so tricky. It is not easy to anticipate the workings of somebody else's mind. CoCo allows you to create the legend in innumerable ways.

That brings us to the face from last month's tutorial. Comparing the drawing with the actual CoCo rendition, we are struck that it is narrow — narrower than we would prefer! The figure needs eyes badly and that nose has to go!

For openers, let's put in some eyes and eyebrows. Type `LIST-100`. Yeah! But where are the eyes? Run it. We look for clues. It is almost certain that each eye consists of `ERF`. Two eyes means we are likely to find two sets of `ERF`s near each other. Type `LIST-20`. Good news! It looks as if the eyes were the first feature drawn. A good way to check is to inject an obvious pointer between `70` and `E`. Insert `G10` or `H10` and run. The graphic is likely to be distorted, but the line will point to the edge of the eye. We now know where and which eye was drawn first. We remove the pointer and run. Now type `LIST 20`. On graph paper we trace out the eyes to see in which order they were drawn.

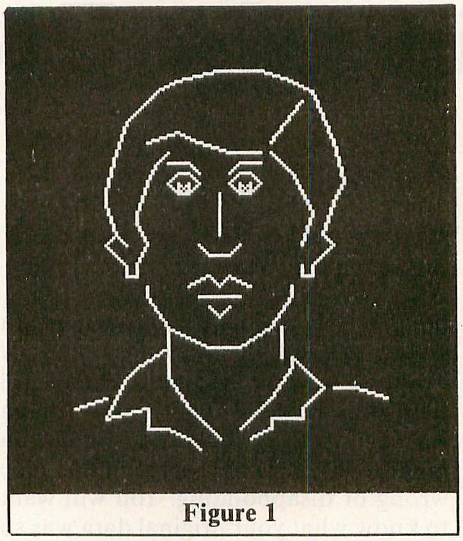


Figure 1

Luckily, we have Figure 1 from last month's tutorial to consult. We compare Line 20 with the sketch and note the route followed: right eye to left eye to nose to mouth. We now know we can work on the eyes in peace.

Beginning at the inside of the right eye, finish up the eye; move up and do the right eyebrow; do the left eyebrow and drop down to rework the left eye. I sketch out my planned units. After the first `ERF`, I make the insertion `GUGRHDH` and run. It looks like a Cyclops, but distortions are to be expected. I continue inserting, with `BHE2R2F`, and run. Now insert `BRER2F2BG` and `GUGRHDH`. Run it. We are off to the left. Type `LIST 20`. Can you see that `BR3` has to go?

The original eyes were separated by `BR3`. Since we covered the eyes and eyebrows without any gaps, we don't need that space anymore. Look at Figure 1. What we require now is to yank `BR3` to do the top of the eye. Run. The nose must go over one unit to the left — maybe two units. Type `LIST 20`. We see that the move from eye to nose is `BM-3,1`. We try `-5` in place of `-3` and run. No good! Try `-4` and run.

The eyebrows seem too high. Let's change `E2` to `E` and `F2` to `F`. Run. Now it's cross-eyed. Let's increase the space between eyebrows two units, from `BR` to `BR3`, and run.

The nostrils are pathetic! How would it look if we zapped the nostril and just kept `FRE` to suggest a nose? We want `BM-2,1` to replace `BM-3,1DE`. `FRE` stays, but `FNU2` goes! Now type `LIST 20`. We know `D4` is the nose. Change `BM-3,1` to `BM-2,1`, delete `DE` and run. Good! Pull out `FNU2` and run. We need to change `BD3` to `BM+1,3`.

If we made the tip of the nose wider, `R2` instead of `R`, then we would need `BD4` instead of `BM+1,3`. Run. Not so hot! Let's move the nose tip one unit to the left. Type `LIST 20`. Next, type `BM-3,1` and `BM+1,4` to replace `BM-2,1` and `BD4` and run. The nose, `D4`, should be one unit to the left. Or, suppose we change `D4` to `M-1,4` and `BM-3,1` to `BM-2,1`? Run. Terrible! Restore `D4` and leave `BM-2,1` alone. Run again. I am not too crazy about the eyebrows, but let them go for now.

Let's make the face wider by one unit. We will add one unit each to the horizontal areas of the chin, top of head and forehead. First, the chin: It is either `L4` or `R4`. Type `LIST 20` and look for either one. An `R4` is on the bottom line. We shall put a pointer in front of `R4` to see if we are in the right place. Insert `D10` in front of `R4` and run. The face is distorted, but if you look carefully you will see we hit the location right on the chin. Delete `D10` and, while you are at it, change `R4` to `R5` and run.

The forehead looks like `R2`. It must be in Line 21 or 22. Type `LIST 21`. There is no `R2`, but there is an `L2`. Let's put a pointer, `D10`, in front of `L2` and run. Yes! The face is distorted, but we are in the right pew. Remove the pointer and change `L2` to `L3`.

The last `R3` on top of the head must be changed to `R4`. Type `LIST 21`. An `R3` is down about the 130th character. We put a pointer, D10, to verify the location, in front of R3 and run. Right on the money! Remove the pointer and change R3 to R4 and run.

The left side of the shirt is one unit off. It must be where it touches the neck. The part, M-3,2 or M+3,-2, needs to be moved over. Type LIST 21. No such animal. Type LIST 22. There is an M-3,2 about 70 characters into the line. Put a pointer, R10, in front of it to see if we are zeroed in and run. That's it! But, what is the correction? Type EDIT 22. Remove the pointer, R10. BE looks like the guilty party. Change it to BH and run. Close! Type EDIT 22 and change BH to BU. Now run.

Back to the eyebrows! Type LIST 20. Suppose we change the first E to BE and the second F to BF in the eyebrows? Run. Now the eyes are not bulging.

That R5 chin should be R3. That would change the preceding M+3,2 to M+4,2 and the following E2 to M+3,-2. Make the changes and run.

At this stage, I wandered away from CoCo and took a break. Returning refreshed, I looked at the face more critically and noted that the R3 lip line needs an additional unit to balance it. Type LIST 20. It is easy to spot, being about 110 characters into the program line. Fortunately, the movement in front of it is BR. What is easier than deleting the B to expose the R and accomplishing the mission without disturbing the shape of the face? Run.

This leaves the itty-bitty L or R dimple/lower lip line. It needs to be widened to put the face into a more balanced position. Type LIST 20. No doubt, it followed the RR3. We could change this to R4, but who is going to inspect our work and object to our awkward construction? We must be on the lookout for the L that follows.

To widen L without distortion, caused if we use L2 to add one unit, a better method is to use NL after L. This way, we move one unit left and return one unit right. It doesn't affect the following offset which, if you check it out against Figure 1, moves up to the right jaw line. Run.

I don't like it! It is too wide. To try to shorten its length, replace LNL with GNH and run. It doesn't look especially attractive, but I'll settle for it.

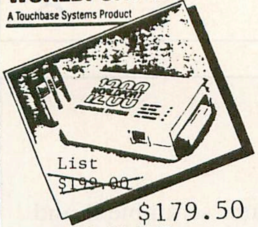
The ear could be integrated with the sideburns by removing those angles, but I like the suggested, stylized face.

There is one more error I overlooked. It is a problem for you to solve. Note that the right, inner side of the lapel should be located one space to the left (consult Figure 1). Make the modification on your own initiative, then congratulate yourself on mastering this tutorial. Save FINALF if desired.

You were subjected to many alterations in this tutorial so that you would have the confidence to rip apart and rearrange those pesky components in the DRAW statements. The newcomer may be uneasy with the graphics capabilities, but now he knows how to debug his own programs with every expectation of ending up with a solid graphic.

Some of the changes we made seem petty. When you are working on your brainchild, they take on an aura of importance because you want a perfect graphic.

I hope you enjoyed having your cage rattled and working out these little bugs because I want to excite, challenge and encourage your desire to create an innovative program on your favorite computer. ☐



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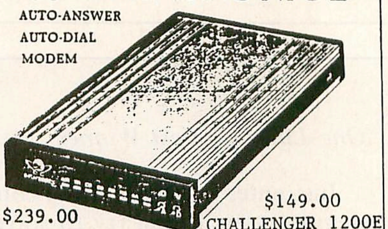

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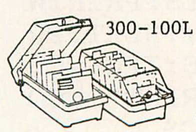

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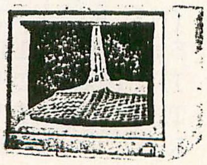

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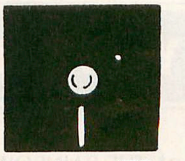

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Listing 1:

```
0 '<LISTING1>
10 PMODE4,1:PCLS:SCREEN1,0
11 GOTO 200
20 DRAW"S16BM105,70 ERFBR3ERFBM-
3,1D4BM-3,1DEFREFNU2BD3M-2,-1GHM
-2,1BFBRR3BGL BL7BU2NUM+2,3ND4M+
3,2R4E2M+2,-3U"
21 DRAW"BU4BRM+1,-3M-2,-4H2BUNM+
3,-4BGL2 M-3,-1M-2,-1M-3,1 BM+2,
1GM-1,2M-1,3DM+1,2M-1,2DL UH2ENF
M-1,-3UM+1,-4M+1,-3E3M+2,-1M+4,-
1R3 M+3,1M+2,1M+2,5M+1,4M-1,2M-1
,3FG2DLNU"
22 DRAW"BD5BL2D3BRNF3DM-2,3G3 BF
M+2,-1UR3UE2BRR2M+3,1 BD4BL16H3M
-2,-3U2BEM-3,2GM-2,4 BL3BUM+3,-1
BD2M+4,-1D2R2M+2,1F"
100 GOTO 100
200 DRAW"S4BM107,95U3NR3U3R4BR3D
6BR3U6R4BD4NLD2NL4BR3NU6R4U6BR3N
D6R4D4L2NL2F2BR3U6NR4D3NR3D3R4BR
4BU5ED6NLR"
250 FOR Z=1 TO 1000:NEXT:PCLS:GO
TO20
```

Listing 2:

```
0 '<FINALF>ACE
10 PMODE4,1:PCLS:SCREEN1,0
11 GOTO 200
20 DRAW"S16BM105,70 ERF GUGRHDH
BHBER2FBR3ER2BFBG  GUGRHDH ERFBM
-4,1D4BM-2,1FR2E BM+1,4  M-2,-1G
HM-2,1BFRR3BGGNH BL7BU2NUM+2,3ND
4M+4,2R3 M+3,-2M+2,-3U"
21 DRAW"BU4BRM+1,-3M-2,-4H2BUNM+
3,-4BGL3 M-3,-1M-2,-1M-3,1 BM+2,
1GM-1,2M-1,3DM+1,2M-1,2DL UH2ENF
M-1,-3UM+1,-4M+1,-3E3M+2,-1M+4,-
1R4 M+3,1M+2,1M+2,5M+1,4M-1,2M-1
,3FG2DLNU"
22 DRAW"BD5BL2D3BRNF3DM-2,3G3 BF
M+2,-1UR3UE2BRR2M+3,1 BD4BL16H3M
-2,-3U2BU  M-3,2GM-2,4 BL3BUM+3,
-1BD2M+4,-1D2R2M+2,1F"
100 GOTO 100
200 DRAW"S4BM107,95U3NR3U3R4BR3D
6BR3U6R4BD3NLD3NL4BR3NU6R4U6BR3N
D6R4D4L2NL2F2BR3U6NR4D3NR3D3R4BR
5BU5ED6NLR"
250 FOR Z=1 TO 1000:NEXT:PCLS:GO
TO20
300 'PROBLEM SOLUTION: CHANGE
BL16 TO BL17 IN LINE 22.  IF YOU
PREFER ALSO CHANGE THE FOLLOWING
BU TO BE.
```

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The listing:

```
1 DIMM$(100):CLS:INPUT"ENTER WOR
D";W$:C$=W$:L=LEN(W$):FORI=1TOL:
R=RND(L):M$(I)=MID$(W$,R,1):MID$
(W$,R,1)=CHR$(1):NEXT:CLS:PRINTW
$;:FORI=1TOL:PRINTM$(I);:NEXT:PR
INT:INPUT"YOUR GUESS";G$:IFG$=C$
THENPRINT"CORRECT"ELSEPRINT"INCO
RRECT":PRINT"IT WAS: ";C$
```

Evan Durant
Bay Minette, AL

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

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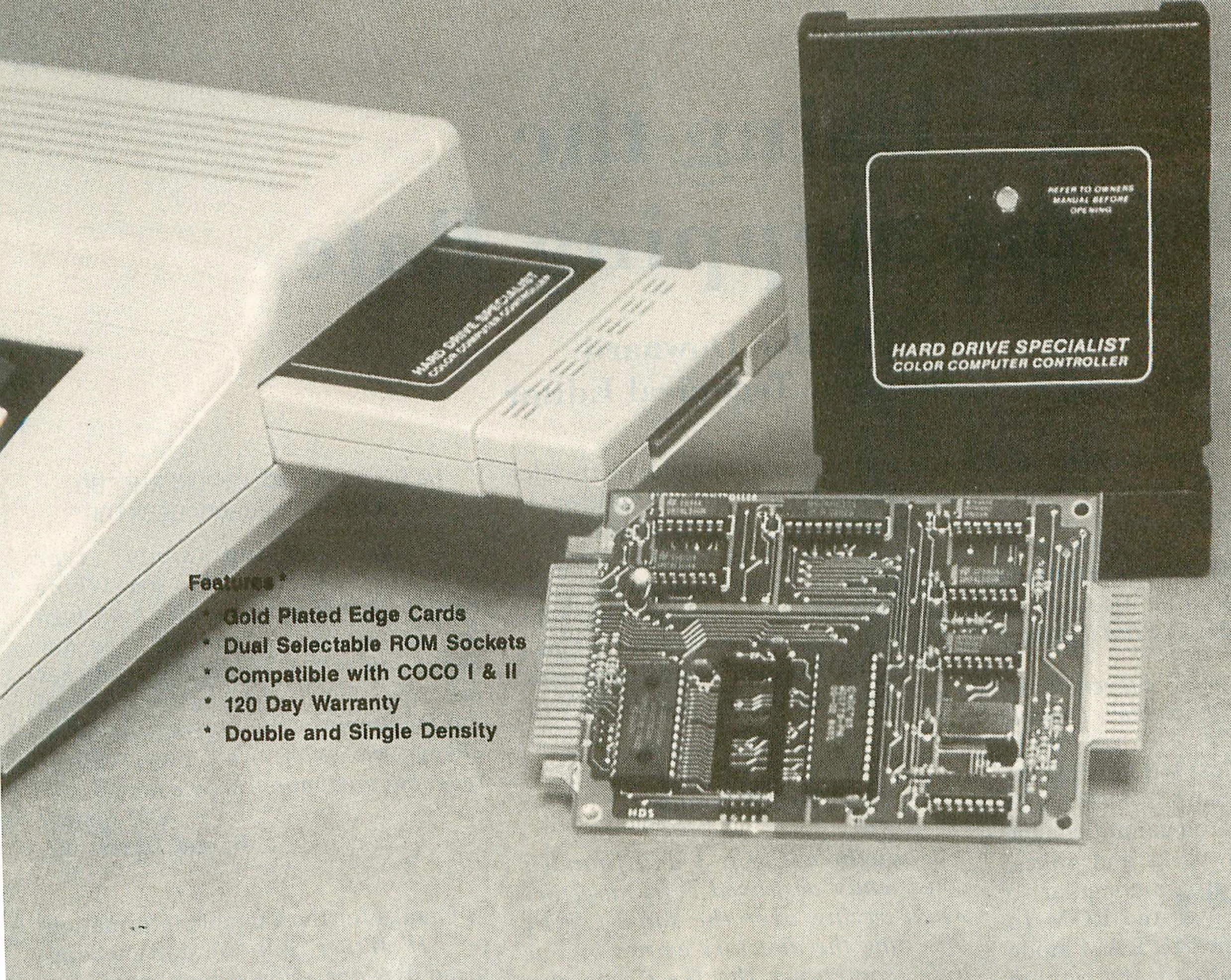
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Using the 6 ms Stepping Rate

By Dan Downard
Rainbow Technical Editor

I have a Radio Shack thinline disk drive and a 64K ECB CoCo 2 (Version 1.1), and I have been trying to increase the stepping rate to 6 ms. I know the disk drive can handle it because it works at 6 ms on OS-9. I've tried `POKE 55232,0:POKE 55318,20` *but it doesn't work.*

Steven Haase
Englehart, Ontario

Steven, you are close but missing one thing. Memory locations 55232 and 55318 are in ROM. You cannot change ROM memory with peeks and pokes. You have to run a program similar to *ROMRAM*, which moves the ROM to RAM and enables the 64K RAM mode of your CoCo. I'm sure that everything will be OK after you run *ROMRAM*, or a similar program.

DLOAD Discovery

I have a 16K CoCo 2 without disk drives. One day while experimenting with commands, I typed `DLOAD` *and it hung up. I had to reset the computer to get the cursor back. What does the command* `DLOAD` *do? If it does nothing, why is it there?*

Steve Nilsen
Seattle, WA

`DLOAD` was a command to transfer programs from one computer to another, such as in a classroom environment. There was a flaw in the original ROM, and it would not work unless the command was patched. This command has been overwritten by the CoCo 3 BASIC ROMs to add new commands. Gook luck, Steve, and thanks for writing.

Clever Solutions

I bought a CoCo 3 and found it consistently destroyed every directory when saving over the same file by offsetting the directory entries by one byte (sometimes the GAT was also destroyed, sometimes it was not). When I stopped using the high-speed poke, it worked perfectly every time. In other words, for reliable operation, do not use the high-speed poke when performing disk I/O.

VIP Desktop *automatically sets the VDG to colors that look terrible on a monochrome monitor. Fortunately, the program may be used to fix itself using Disk-Zap.*

Track 33, Sector 8 — change byte 41 from F0 to F8
Track 33, Sector 6 — change byte 34 from 03 to 0F
Track 33, Sector 7 — change byte 110 from 03 to 0F
Track 24, Sector 4 — start at byte 9, replace 12s with `86 03 B7 FF 22`
Track 26, Sector 4 -- starting at byte 85, put in `86 03 B7 FF 22 7E 46 E7`
Kill `CHECK64K/SHT` *and save the following program as* `VIP.BAS`:

```
10 POKE&HFFBC,0:POKE&HFFBD,
  48:WIDTH32:LOADM"DESKTOP"
```

To use Desktop, *simply type* `RUN"VIP"`. *This patches everything except Terminal (which uses both high and low resolution screens). The low resolution is OK (when these patches are used). When entering the terminal mode, simply press CLEAR-SHIFT-8 to change the color. Now everything is readable on a monochrome monitor.*

Bill Pinnell
Winter Haven, FL

Thanks for the valuable information on *VIP Writer*, Bill. We don't recommend disk operation at high speed.

EDTASM Disk I/O

I have a 64K ECB CoCo with disk drive. I have EDTASM+ *in ROM pack. Could you print the program instructions to convert the ROM pack to disk I/O?*

Marcel Beausoleil
Woonsocket, RI

See the next answer for some hints for the original program to use your *EDTASM+* with disk, Marcel.

Superpatch Fixes

Roger Schrag's Superpatch *(September 1983) was written for Disk BASIC 1.0. After correction was made*

Dan Downard is an electrical engineer and has been involved in electronics for 27 years through Ham radio (K4KWT). His interest in computers began about eight years ago, and he has built several 68XX systems.

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The WIZ

By Bill Brady

The Wiz is the **First** and **Only** program designed for the CoCo III that uses **WINDOWS!** The Wiz is a smart terminal and communications program for the CoCo III and OS9 Level II. Making use of multiple windows and overlay windows with pop up dialog boxes The Wiz really shines. Features include: Autolog- lets you configure The Wiz's colors, characters boldface etc., Xmodem and text send and receive, sleep mode, conference mode uses a separate window for your text, usage log and much more. Does not work with the CoCo's internal bit banger serial port. The complete package includes a special ACIA driver that allows baud rates from 300 to 19,200 baud. Requires the RS232 pak or the Disto RS232 or similar port plus a CoCo III with OS9 Level II.

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for the 1.1 Version, the program worked beautifully. The corrections are:

Line	1.0	1.1
149	$CEA2	$CF7E
172	$CF07	$CFE3
258	$CA3B	$CAE9
298	$C8A4	$C952
321	$C468	$C48D
392	$CBD2	$CCAC

Gordon Shephard, Sr.
Albany, CA

Thanks for the information, Gordon. As you can see in the previous letter, there is still quite a demand for the original patched version of EDTASM, even though Tandy has introduced a disk version.

Understanding Memory

What do you recommend for a good CoCo memory map that would cover BASIC 1.2 and RS-DOS 1.1? I am looking for a map that comments on what each address does and breaks it up into the different subroutines it may encompass. It would have to be in a format that could be understood by new ML programmers. A lot of maps use codes for their comments that are not included in the normal process of assembly language learning.

I have looked at Disk Basic Unravelled *and the other books in the set, but they are somewhat difficult for a beginner to understand. What is FDC?*

Merle Metzger
Tucson, AZ

I'm glad you wrote, Merle, as you are quite typical of the beginning CoCo user. To have a good understanding of the CoCo, you must have a good working knowledge of both hardware and assembly language programming. This is no easy task for the novice. I suggest *TRS-80 Color Computer Assembly Language Programming* by William Barden, Jr. (Radio Shack Catalog No. 62-2077) as an excellent start. By the way, FDC stands for floppy disk controller.

High Resolution Graphics

I have written an assembler program that does graphics on the CoCo 2 based on a music input through the cassette port, but my output on the text screen looks a little crude. How can I get to `PMODE 3` *or* `PMODE 4` *in assembler?*

Joseph Weintraub
Woodside, NY

The address of the VDG in your CoCo 2 is $FF24. Figure out the color combination you want using the High Resolution Graphics section of the *Getting Started with Color BASIC* manual. Load this value into Register A and do a `STA $FF24`. If you want to see how Microsoft did it, disassemble the ROM at $9621.

On the Fritz

I have a problem with Color Scripsit. *Once I accidentally pulled the pack out of the computer while it was still on. Now my cursor moves across the screen randomly. I can't use* Color Scripsit, *and when I press SHIFT-CLEAR, I get a 'Y' instead of a slash. What is wrong?*

Keith Tysinger
Asheboro, NC

Keith, it sounds like you need a new 6809E microprocessor. I would replace it and see if the problem disappears.

Underlining Made Easy

In your May 1987 column, Bill Hodges said that he was unable to underline the spaces between words when using his CoCo and Telewriter 64 *with a DWP-220. I have the same setup, and complete underlining can be had by adding one more embedded command at the top of your text. Right below* `^D1 15` *and* `^D2 14`, *add* `^DP3 95`. *When you type a line you want underlined completely, begin the line with a CLEAR-1, end it with a CLEAR-2, and wherever there is a space in the line, insert a CLEAR-3. This causes a _ character to be printed in each space, giving you underlining that looks like this, not this. This also works with a Tandy DWP-230.*

Dan Weaver
Amsterdam, NY

Thanks for the tip, Dan. I have received quite a few solutions to this problem, and yours is one of the quickest. Evidently you are doing fine with word processing from the appearance of your letter.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "Downloads" online form, which has complete instructions.

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KISSable OS-9

Controller Attacks Halt Line Problem

By Dale L. Puckett
Rainbow Contributing Editor

We recently had the pleasure of meeting David C. Wiens of Sardis Technologies, a man with a great idea in a brand new hardware product at the Chicago RAINBOWfest. He was taking orders for his new DMC Disk controller. DMC stands for Dual Mode Controller.

If you've ever lost half your command line trying to type ahead while OS-9 was accessing your disk drives, you'll appreciate Wiens' new disk controller card. You'll also appreciate it if you have had trouble using your CoCo to gather real-time data in a laboratory or lost large chunks from incoming messages from an online data service like Delphi while OS-9 was reading a disk file you were printing in the background.

Wiens' next statement sounded like an excellent sales pitch, but it also made a lot of sense. "The waste of processing power caused by the continuous halting of the 6809 microprocessor is up to twice as bad with the CoCo 3 as it was with the CoCo 2," he said. "Why? Because the CoCo 3 can run at twice the speed, twice as many instructions could have been executed during the time the 6809E is halted."

Ironically, the fault does not lie with the CoCo itself, or with OS-9. Rather, all the blame can be assigned to the disk controller. And unfortunately, all other disk controllers on the market at this time have the same problem.

To maintain full compatibility with existing software, Wiens designed the DMC controller with two modes. It retains the current Radio Shack "halt" mode, but also adds a new "no halt" mode. In the latter mode, the DMC can read from or write to a disk by itself while your 6809E continues to run independently, crunching your data or scanning your keyboard, etc. The 6809 is only needed at the beginning when it initiates the read or write operation and at the end when it checks the status and moves the data to your Color Computer's main memory area.

The DMC controller comes with an 8K cache memory, but you may add up to 32K. It uses a Western Digital WD1773 controller chip and comes with a version of Dan Johnson's *SDisk* software, which has been modified to

---

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Complete Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale is a U.S. Coast Guard lieutenant and lives in Rockville, Maryland.*

Listing 1: Vmode

```
**************************************************************
*
* VMODE  -  COPYRIGHT (c) 1986 by S. B. GOLDBERG
*
* Sets and displays disk write verification mode.
*
* Use: vmode [opt]
*      v=verify on
*     -v=verify off
*
* Examples:
*         vmode <ENTER>
* Displays current verification mode (on/off).
*
*         vmode v <ENTER>
* Turns verification on (default state).
*
*         vmode -v <ENTER>
* Turns off disk write verification.
*
          ifp1
          use    /d0/defs/os9defs
          endc
```

```
*
         mod    len,name,prgrm+objct,reent+1,entry,dsiz
*
mode     rmb    1   verify mode
         rmb    200   stack
         rmb    50   param
dsiz     equ    .
*
name     fcs    /vmode/
         fcb    1   edition number
         fcc    /(c)1986 S.Goldberg/
d0       fcc    /d0 /   device descriptors
d1       fcc    /d1 /
d2       fcc    /d2 /
d3       fcc    /d3 /
************************************
*
* CHECK SYNTAX AND INITIALIZE
*
entry    clr    mode   verify 'on'
         ldd    ,x+   param chars.
         cmpa   #$0d   param?
         beq    display   no, display mode
         cmpa   #'-   hyphen?
         bne    chkend   no, check for 'on'
         inc    mode   yes, set mode 'off'
         ldd    ,x   get next chars.
chkend   cmpb   #$20   end of param?
         bhi    bad   no, syntax prompt
         ora    #%00100000   yes, make lower case
         cmpa   #'v   is it 'v'?
         bne    bad   no, syntax prompt
************************************
*
* PATCH DEVICE DESCRIPTORS
*
         leax   <d0,pcr   dev. descript.
         bsr    patch   set mode
         leax   <d1,pcr   dev. descript.
         bsr    patch   set mode
         leax   <d2,pcr   dev. descript.
         bsr    patch   set mode
         leax   <d3,pcr   dev. descript.
         bsr    patch   set mode
noerr    clrb    clear error
out      os9    f$exit   quit
patch    bsr    link   link for address
         bcc    getmode   no error, continue
         cmpb   #221   module in memory?
         bne    out   exit with other error
         rts    no, return
getmode  lda    mode   verify mode
         sta    $1a,u   place in descriptor
************************************
*
* CALCULATE DESCRIPTOR CRC
*
         tfr    u,x   module start
         ldd    2,u   module length
```

make full use of the controller's no halt mode under OS-9. It also will let you use 35-, 40- or 80-track drives, single- or double-sided, in every existing OS-9 disk format including MIZAR OS-9, as well as OS-9 68K and Japanese OS-9.

Database Applications Hit Market

Two major OS-9 Level II-based database applications were shown at RAINBOWfest Chicago. Both *CSG IMS* (*Information Management System*), $169.95 from Clearbrook Software Group, 446 Harrison St., P.O. Box 8000-499, Sumas, WA 98295, Phone: (604) 853-9118; and *Sculptor*, from Microprocessor Developments Ltd in London and distributed at $495 from FHL, 770 James St., Syracuse, NY 13202, Phone: (315) 474-7856, appeared to be selling quite well.

We hope to take a detailed look at these powerful database products and feature sample applications written in both languages during the next several months. In the meantime, the pressure of a book deadline forces us to restrict this month's offering to an overview of each program.

The *CSG IMS* uses a language similar to *dBase II* from the IBM PC world. In fact, its extensions move it close to *dBase III*. *IMS* uses Balanced Tree Indexing, which allows several users to access your data files simultaneously. It also means you will not need to periodically reorganize your data files. You may store up to 1,073,741,824 records in a database, and a single text field can contain up to 32,768 characters. You may use up to 127 unique indexes.

The *CSG IMS* compiler lets you develop complex applications quickly and easily. It contains more than 25 file-related functions, more than 20 I/O functions and several dozen commands and functions that let you control the flow of your program, perform mathematical operations, manipulate text and trap errors. A unique feature lets you convert text values to sound codes, which means you will be able to search for "sound alike" names. A screen I/O program lets you build a "fill-in-the-blanks" form on your CoCo screen. *CGS IMS* will take it from there and automatically create a database maintenance program based on that screen.

An interactive environment built into *CSG IMS* lets you search for important data without writing a report program. For example, if you need to know which salesman sold more than $1,000 worth of merchandise in March, you could simply type:

```
LIST FOR sales(3) 1000
print name, sales(3)
```

You drive *CSG IMS* through a menu that gives you access to a text editor, file generator, screen form generator, report generator, language compiler, language interpreter, interactive environment and OS-9. *CSG IMS* application and data files may be ported to other versions of the program that run on all versions of OS-9. Clearbrook plans future implementations for MS-DOS, the Atari ST and Amiga.

Clearbrook also has an offering that may interest OS-9 hackers. They are selling *ERINA*, a user-mode debugger developed by Seikou Electronics Co. of Japan. *ERINA* includes a small disassembler, an assembler and two dozen commands that speed up program debugging. Commands include Compare, Dump, Examine Registers, Execute, Fill, Goto, Input, Link, Memory Examine, Output, Protect, Quit, Search, Transfer, Unlink, Verify, Display, Trace, Print, Set Breakpoints, Set Dot Variables, Evaluate and Help.

Sculptor: A Fourth Generation Language for CoCo

Third-generation programs were written in high level languages like BASIC, COBOL or C. After they were written, they had to be compiled or interpreted. To generate a database application, the programmer had to oversee every last detail of the program.

Today, fourth-generation languages like *Sculptor* from Microprocessor Developments, Ltd, and FHL make the job of generating a database application program much easier. They do this by delivering a complete set of development tools. Each part of the set is designed to do a particular job for the programmer.

```
          subd  #3    less CRC bytes
          tfr   d,y   update length
          leau  d,u   CRC accumulator
          ldd   #$ffff   initialization value
          std   ,u    initialize the
          sta   2,u   CRC accumulator
          os9   f$crc   do count
          bcs   out   exit with error
          com   ,u+   complement
          com   ,u+   the CRC
          com   ,u    count bytes
          rts   return
************************************
*
* GET DESCRIPTOR ADDRESS
*
link      clra   any type, language
          os9   f$link   link to descriptor
          bcs   back   return on error
          os9   f$unlink   unlink
back      rts   return
************************************
*
* DISPLAY THE CURRENT MODE
*
display   leax  <d0,pcr   device descriptor
          bsr   link   get address
          bcs   out   exit with error
          leax  <on,pcr   verify on message
          lda   #1   standard output path
          ldb   $1a,u   get mode
          beq   print   verify on, print & quit
          leax  <off,pcr   off message
          bra   print   print & quit
************************************
*
* SYNTAX ERROR PROMPT
*
bad       leax  <syntax,pcr   syntax prompt
          lda   #2   standard error path
print     ldy   #100   max. length
          os9   i$writln   to screen
```

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```
            bcs    out    exit with error
            bra    noerr  quit
*
syntax      fdb    $070a
            fcc    /Use: vmode [opt]/
            fcb    $0a
            fcc    /    v=on  -v=off/
            fcb    $0d
on          fcb    $0a
            fcc    /Verify: ON/
            fcb    $0d
off         fcb    $0a
            fcc    /Verify: OFF/
            fcb    $0d
            emod
len         equ    *
            end
```

Listing 2: `Files`

```
/* Copyright (c) 1986 by Gregory A. Law */
#include <stdio.h>
#include <ctype.h>

struct {                                        /* directory entry structure */
     char       name[29];
     char       lsn[3];
} dir;

struct new {                                    /* allocation map structure */
     char       psn[3];
     unsigned   sectors;
};

struct {                                        /* file descriptor sector structure */
     char       attr;                           /* file attributes */
     unsigned   owner;                          /* owners user ID */
     char       mod_date[5];                    /* modified date */
     char       link;                           /* link count */
     long       size;                           /* file size */
     char       creat_dat[3];                   /* date created */
     struct new alloc[48];                      /* allocation map array */
} fd;

FILE *pn;
FILE *fpn;
char filename[30];

main(argc, argv)
int   argc;
char *argv[];
{
     char path[255];
     char fpath[255];
     long offset;
     int  i;

     pflinit();                                 /* initialize floating point */

     if(argc == 1) {                            /* if no arguments */
          if((pn = open(".", 0x81)) == EOF)
               exit(errno);
          if((fpn = open("@", 0x01)) == EOF)
               exit(errno);
     } else {
          if((pn = open(argv[1], 0x81)) == EOF)
               exit(errno);
          chdir(argv[1]);
          if((fpn = open("@", 0x01)) == EOF)
               exit(errno);
     }

     printf("Filename            LSN Sectors  LSN Sectors  LSN Sectors\n");
     printf("--------------- ------ ----  ------ ----  ------ ----\n");
     while((read(pn, &dir, sizeof(dir))) != 0) {
```

When you write a fourth-generation program, you combine selected portions from the existing set and tailor them to meet your own needs. You do not have to go back to the basics and code every detail. Essentially, the fourth-generation language does the low-level coding for you.

> ***". . . you will be able to search for 'sound alike' names."***

For example, *Sculptor* includes tools to create and maintain indexed data files, describe data dictionaries, create and update screen forms, write reports, make menus, generate programs and make inquiries into a database.

One of the beauties of the *Sculptor* system is its automatic program generation. Two programs, `sg` and `rg`, create standard programs for you automatically after you have defined the record layout and created a keyfile for your data. `sg` generates a program that lets you input, delete or amend data in the keyfile by filling in the blank spaces of a form on your screen. `rg` generates a program for you that will produce a printed report from your database.

While Frank Hogg awed the RAINBOWfest crowd with *Sculptor*, his nephew Rich and new assistant Nancy sold many copies of *DynaStar* with *DynaForm*. Both programs have been rewritten in C and customized to take advantage of the CoCo 3 and OS-9 Level II. As a bonus for CoCo 1 and CoCo 2 users, FHL put all older versions of *DynaStar* on the same disk with the new release, including the original version that works with any terminal supported by the proper `GoToXY` module.

The new CoCo *DynaStar* determines what kind of terminal you are using by reading a file named `termset` in your `SYS` directory. The file `termset` is also used by Microware's `Scred`, the screen editor that Tandy includes in the OS-9 Level II developers package. CoCo users don't need to worry about `termset` unless they are using an external terminal. They need only copy the

`SYS/termset` file from the FHL *DynaStar* distribution to their system disk.

On the other hand, you can amuse yourself for hours just playing with the last four parameters on each `termset` line. These bytes change the color of the foreground and background of both the main window and the overlay windows *DynaStar* uses to display its help messages. They are in this order:

1. Foreground color of help menus
2. Background color of help menus
3. Foreground color of text screen
4. Background color of text screen

If you load *DynaStar* first, you can pop in and out of it quickly and observe what happens each time you change one of the bytes above. I experimented with different color schemes for nearly an hour before I made up my mind.

If you hook up a Televideo 910 terminal to device `/T2` through the RS-232 pack in slot one of your Multi-Pak interface, you will find that it works perfectly. You'll also find lines for a half dozen other terminals in the `termset` file supplied.

DynaCalc Patches

Karl Quinn of Terminal Island, California, wrote us recently and passed along several patches that fix minor bugs in Version 1.00.00 of *DynaCalc*. The first change fixes the problem of an extra line feed being sent after every carriage return when printing a report. Specific instructions that use only "vanilla" OS-9 commands are available at no cost from Radio Shack Computer Centers. The quick fix is to use Computerware's `patch` utility to make the following changes:

Offset	**Old**	**New**
0007	80	81
0008	63	62
4BE2	26	20

Make sure you use the `v` command before you exit `patch`, to ensure that *DynaCalc*'s CRC is updated. A second bug attacks you if you use the DMP-105 or DMP-120 Tandy printers, which do not recognize the "Top of Form Feed" character that *DynaCalc* sends out. Change the following byte:

Offset	**Old**	**New**
5000	0C	0D

Again, don't forget to update the CRC with the `patch v` command before quitting.

```
                strhcpy(filename, dir.name);
                if(filename[0] != '.' && filename[0] != '\0') {
                    l3tol(&offset, dir.lsn, 1);
                    offset *= 256;
                    lseek(fpn, offset, 0);
                    read(fpn, &fd, sizeof(fd));
                    show();
                }
        }
}

show()
{
        long offset;
        int  i;

        printf("%-15s", filename);
        for(i = 0; i <48; i++) {
                l3tol(&offset, fd.alloc[i].psn, 1);

                /* long way of saying 'if(i % 6 == 0)' */
                if(i == 6 || i == 12 || i == 18 || i == 24 || i == 36)
                        printf("\n               ");
                if((i!=6 || i!=12 || i!=18 || i!=24 || i!=36) && offset == 0) {
                        printf("\n");
                        return;
                }
                if(offset == 0)
                        return;
                printf(" %061X %04X ", offset, fd.alloc[i].sectors);
        }
}
```

Try OS-9 on Duane Perkins' BBS Before You Buy

We received an interesting offer from Duane Perkins, P.O. Box 255, Mount Gretna, PA, (717) 964-3536, this month. He has written a BBS system named "9-Online" that lets CoCo owners run OS-9 remotely. Here's how it works.

You send Perkins an alphanumeric username and password and a one-time non-refundable fee. He registers your username and password, gives you an initial allotment of disk space, sends you terminal software you can run on your non-OS-9 CoCo and instructions. Your initial fee buys you three hours of online time. You pay the telephone charges.

Perkins has come up with a novel idea that could be put to good use by local Color Computer Clubs wanting to help their members get started with OS-9. If a club set up a system like this on a local phone line and made it available 24 hours a day, many new people would be able to try OS-9 and get familiar with it before they buy it. Go for it!

This Month's Listings

S.B. Goldberg has contributed `VMode`. This handy utility lets you turn the disk verify routine on and off on the fly. To turn verify on, type `vmode v`. To turn verify off, type `vmode -v`. If you don't remember what state you left the verify utility in, type `vmode` and it reports the current state.

Greg Law is back this month with `files`. This utility shows all your files and lets you peek at the segment allocation table. It is hard coded to 80 columns, as it is primarily designed to be used with a printer. It prints the filename followed by a table showing the LSN and the number of sectors allocated in the entry. ◆

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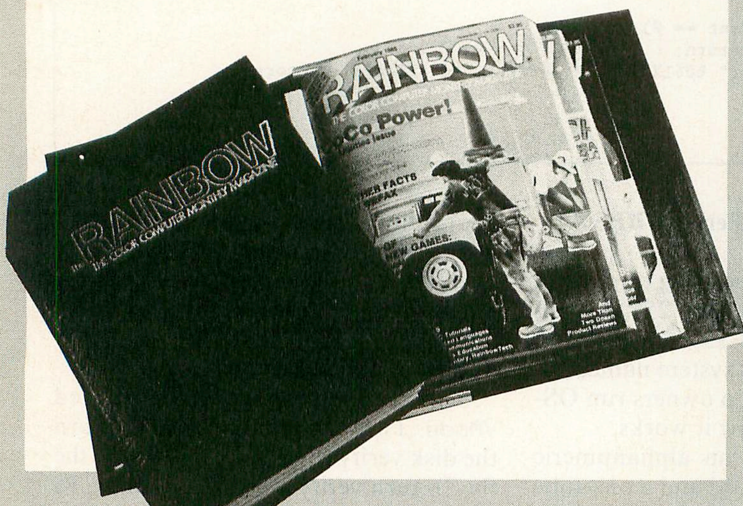

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OS-9 MEMORY

The Problem with BASIC09

By Peter Dibble

BASIC is so powerful I sometimes almost forget that assembly language is the ultimate language. Getting at more than 64K of memory on the 6809 is a challenge in any language. It's almost impossible with BASIC09.

I don't like the dummy editor/printer program I showed you in the May 1987 issue. The only way I could find to start the printer process from a BASIC09 program was the `Shell` command. It worked, but it caused trouble. The programs had to look foolish as they chased around patching the parameters so the shell wouldn't laugh at them changing them back into poetry.

I didn't need the shell. The OS-9 `F$Fork` system call would have done exactly what I wanted. The problem is that there's no way to issue the `F$Fork` system call from BASIC09. Or is there?

There are two ways to do a fork from BASIC09. The easiest way is to use the `SysCall` procedure. (It's on Delphi and in the OS-9 Users Group software library. It also comes with Level II.) It's a little harder to write a special procedure to do a fork, but it will be clean and efficient.

I'll show you how to use an assembly language procedure to make the editor/printer pair from May work much more smoothly.

Peter Dibble has a bachelor's degree in chemistry and is currently a graduate student in computer science. He has worked as an applications programmer, systems programmer and as the user services assistant director for the University of Rochester Computing Center. With Dale Puckett, he is the co-author of The Complete Rainbow Guide to OS-9.

The Programs

Even when it isn't run from the shell, BASIC09 can't deal with carriage return characters on the command line. However, it treats line feeds like any other character. Since a line feed generates a new line when BASIC09 prints it, I put line feed characters, `CHR$(10)`, in the text wherever I want a new line.

The `BFork` procedure is an assembly language procedure meant to be called from BASIC09. It can be called using:

`run BFork (`*command_line*`)`
or
`run BFork (`*command_line, optional_memory*`)`

In both cases, `BFork` starts a process running BASIC09 with the specified command line. If you give `BFork` a second parameter, it acts like the `#` option on a shell command line, e.g., you can give BASIC09 more memory with it.

`BFork` starts a BASIC09 process without using the shell. This means that the command line parameter goes directly to BASIC09. For our purposes, that is a good thing. It means that we can be less careful about what we put in the command line. For instance, if the shell were involved, an exclamation point in the command line would have caused the shell to try to set up a pipe. That's not what we want at this point!

What's Going on in BFork

The first section of `BFork` is all definitions. We set up the page headers and the module header and define a symbol for the Parameter Error code. Except for the page header information, identical lines will appear at the beginning of any subroutine module.

After the module header, we set up symbols for the values BASIC09 will pass in the stack. BASIC09 puts lots of information in the stack. Starting from the bottom (6809 stacks grow down) we have:

- The return address.
- The number of parameters BASIC09 is passing us. This had better be one or two.
- The address of the command line.
- The length of the command line.

If the caller included an optional memory parameter:

- The address of the amount of extra memory.
- The length of the amount of extra memory (2, if this is an integer).

The next part of `BFork` is constant values. There's the name of the program (for the module header to refer to), `BFork`'s edition number, the string "Basic09," and a constant zero.

Next, we get to the program itself. If we were only passed one parameter, we pretend that we were passed an optional memory parameter of zero — that's what the constant zero is for. If there are two parameters, we use the second one as the optional memory. At this point we don't do anything with the optional memory, just leave the X register pointing at it.

Now we worry about the length of the command line. If it's zero, we have problems. There has to be at least the name of the BASIC09 procedure to run. If it's non-zero we put it into the Y register. It looks like it would have been better to put the length of the command line directly into Y, but we're about to use it again.

OS-9 doesn't allocate extra space to

hold a process's parameters. Since parameters are usually shot, this isn't a problem. `BFork` could be passing a long command line, so we worry about it. Optional memory is given in pages, so we have to convert the length of the command line (which we cleverly left in D) to pages and add it to the optional memory.

From here we just set up the rest of the values `F$Fork` needs and do the fork. The process that `F$Fork` starts is called a child. `BFork` waits for the new child to end.

`BFork` returns with the most pessimistic value it can find. If anything went wrong in `BFork`, that error code is returned. If `BFork` runs smoothly, it returns whatever the child returns.

How Does This Fit in?

`Editor` and `Printer` together are tiny. There is obviously no need for `BFork`. The programs are supposed to represent much larger programs. I gave them dignified names to support the fiction that they are large and complicated.

Imagine complicated programs hooked together by `BFork`. BASIC09 uses almost 24K of memory, leaving 40K for your program and data. A 56K program won't fit in memory. If you can divide the 56K program into a 40K part and a 16K part and connect them with `BFork`, Level II will go into action and give you the memory you need.

Remember that we are still working on the second simplest way to access extra memory. The simplest way was to use processes that have nothing to do with each other. This way uses `BFork` (or `Shell`) like a procedure call that can only send values to the called procedure. Values can't be returned. ☐

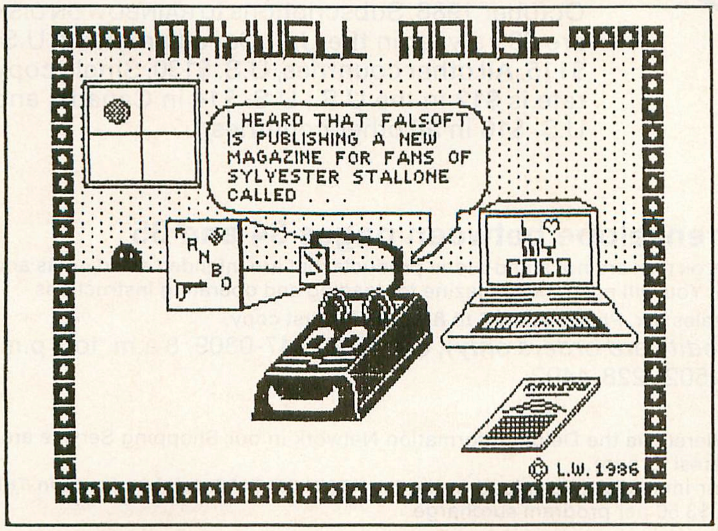
Listing 1: `BFork`

```
                               NAM   BFork
                               TTL   A Basic09 procedure to Fork a Basic09 process
                               IFP1
                               use   /d0/defs/os9defs
                               ENDC
  0021              Type       set   Sbrtn+Objct
  0081              Revs       set   ReEnt+1
  0038              E$Param    equ   $38
  0000 87CD0062                MOD   PgmLen,Name,Type,Revs,Entry,0
D 0000                         org   0          Parameters
D 0000              ReturnA    rmb   2          Return Address
D 0002              ParamCt    rmb   2          Number of parameters
D 0004              ParmArea   rmb   2          Address of cmd line
D 0006              LParms     rmb   2          Length of cmd line
D 0008              MoreMem    rmb   2          Amount of extra mem
D 000A              LMoreMem   rmb   2          Length of MoreMem
  000D 42466F72     Name       fcs   /BFork/
  0012 01           Edition    fcb   1
  0013 42617369     Basic09    fcs   /Basic09/
  001A 0000         DefMem     fdb   0
  001C              Entry
  001C 308DFFFA                leax  DefMem,PCR
  0020 EC62                    ldd   ParamCt,S  Number of parameters
  0022 2335                    bls   PError     Parameter Error
  0024 10830002                cmpd  #2         Are there 2 parameters?
  0028 222F                    bhi   PError     More? Error
  002A 2602                    bne   UseDefM    less? no
  002C AE68                    ldx   MoreMem,S  Default to no memory overide
  002E              UseDefM
  002E EC66                    ldd   LParms,S   Parm length
  0030 2727                    beq   PError     Must be parms
  0032 1F02                    tfr   D,Y        Put parm length where it belongs

       ******
       *  Make sure there is enough memory for the parameters
       *  by increasing the optional memory requirement by
       *  the length of the parameters (in pages).
       ******
  0034 C300FF                  addd  #255       Round up to next page
  0037 1F89                    tfr   A,B        Put # of pages in B
  0039 EB01                    addb  1,X        Add extra pages

  003B 308DFFD4                leax  Basic09,PCR Program to execute

```

```
00045     003F 8611                lda    #Prgrm+Objct Type and language of Basic09
00046
00047     0041 EE64                ldu    ParmArea,S The address of the parameter a
00048     0043 103F03              os9    F$Fork
00049     0046 2510                bcs    End          Error? Bad exit
00050
00051     0048 3402                pshs   A            Save process number
00052     004A            loop
00053     004A 103F04              os9    F$Wait       Wait for child to finish
00054     004D 250E                bcs    WError       Special error exit
00055     004F A1E4                cmpa   ,S           Did the right proc complete?
00056     0051 26F7                bne    loop         no; try again
00057
00058     0053 3261                leas   1,S          pop process #
00059     0055 5D                  tstb
00060     0056 2603                bne    Error
00061     0058 39         End      rts
00062
00063     0059            PError
00064     0059 C638                ldb    #E$Param     Parameter Error
00065     005B            Error
00066     005B 43                  coma
00067     005C 39                  rts
00068     005D            WError
00069     005D 3582                puls   a,pc
00070     005F 2657A8              EMOD
00071     0062            PgmLen   equ    *
```

Listing 2: BFork.dump

```
 1: 87CD 0062 000D 2181 7A00   129104.
 2: 1C00 0042 466F 72EB 0142   24496.
 3: 6173 6963 30B9 0000 308D   103613.
 4: FFFA EC62 2335 1083 0002   233662.
 5: 222F 2602 AE68 EC66 2727   44077.
 6: 1F02 C300 FF1F 89EB 0130   52086.
 7: 8DFF D486 11EE 6410 3F03   178529.
 8: 2510 3402 103F 0425 0EA1   31713.
 9: E426 F732 615D 2603 39C6   166500.
10: 3843 3935 8226 57A8        15662.
```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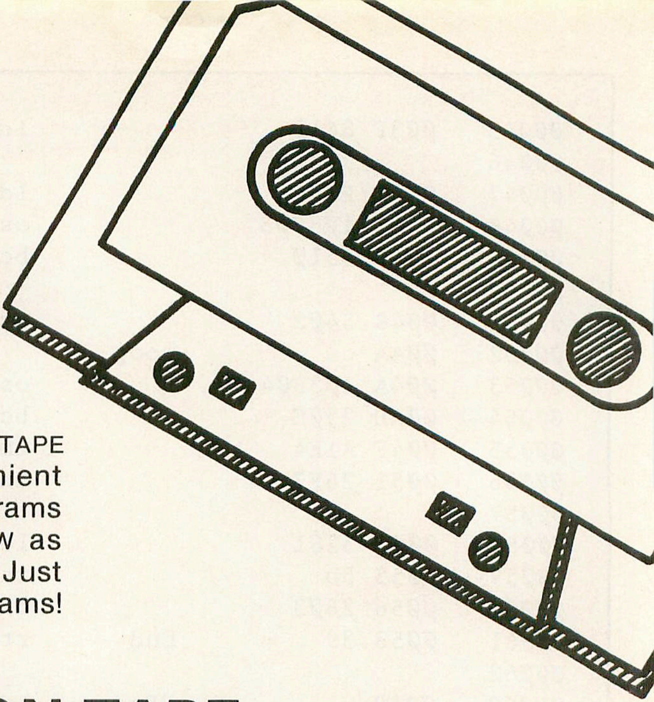

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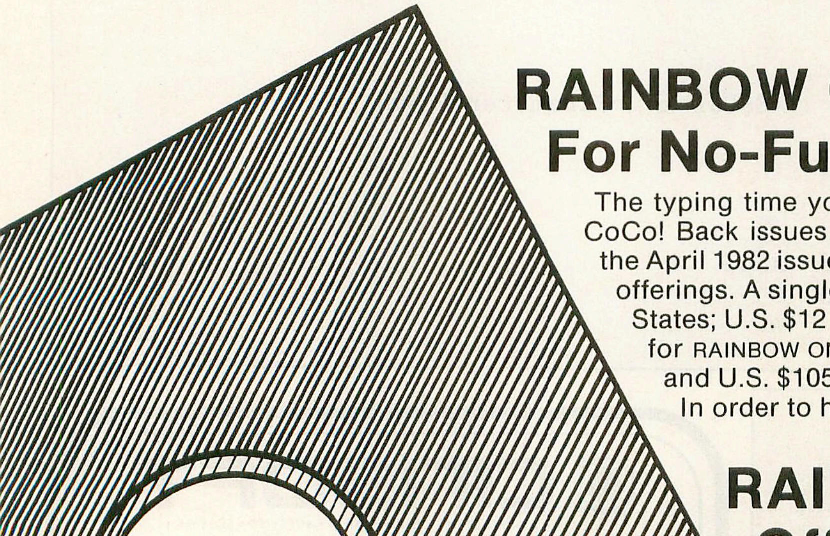

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Listing 3: `Editor_2`

```
PROCEDURE Editor_2
 0000     (* ------------------------------------------------------*)
 003B     (* This program pretends to be part of a text editor that*)
 0076     (* starts a process to print a buffer.                   *)
 00B1     (* ------------------------------------------------------*)
 00EC     DIM cmd_line:STRING[500] \(* Build the print buffer here *)
 0119     DIM i:INTEGER
 0120     DIM InStr:STRING[40] \(* For reading from data statements *)
 0152     DIM DataLength:INTEGER \(* A constant *)
 0169     DataLength=11 \(* The number of strings in DATA *)
 0193     (* ------------------------------------------------------*)
 01CE     (* Read the text from data statements.  Of course, a     *)
 0209     (* real editor wouldn't do this.                         *)
 0244     (* ------------------------------------------------------*)
 027F     cmd_line:=""
 0286     FOR i=1 TO DataLength
 0297       READ InStr
 029C       cmd_line=cmd_line+InStr
 02A8     NEXT i
 02B3     (* ------------------------------------------------------*)
 02F2     (* Finish off the command line.  It will look something  *)
 032D     (* like:  printer ("...")                                *)
 0368     (* ------------------------------------------------------*)
 03A3     cmd_line:="printer ("""+cmd_line+""")"+CHR$(13)
 03C1     RUN BFork(cmd_line)
 03CB     DATA "Allas, poor Yorick!",CHR$(10)
 03E9     DATA "I knew him, Horatio,"," a fellow of infinite jest,"
 0422     DATA CHR$(10)," of most excellent fancy."
 0447     DATA CHR$(10),"He hath bore me on his back "
 046E     DATA "a thousand times",CHR$(10)
 0489     DATA "                 From Hamlet  by Shakespeare"
```

Listing 4: `Printer`

```
PROCEDURE printer
 0000     PARAM buffer:STRING[500]
 000C     PRINT buffer
 0011     BYE
```

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BARDEN'S BUFFER

Learning the Lingo

By William Barden, Jr.
Rainbow Contributing Editor

Sorry about the recent lapse in "Barden's Buffer." I've been trapped in the internals of OS-9 trying to figure out how things work. In any event, I'm back and ready to use the CM-8 Color Monitor I purchased at RAINBOWfest-Chicago. I highly recommend the RAINBOWfests, by the way. There's something for everyone, the prices are excellent, and there are plenty of free seminars. I've attended the last few RAINBOWfests and have given seminars on CoCo languages, a subject dear to my heart. Not only does the CoCo support a new version of BASIC under OS-9, called BASIC09, but it also supports two of the most popular computer languages ever: PASCAL and C. I want to look at computer languages in general and some of the philosophy behind them. In addition, there are some interesting things about using languages under OS-9 on the CoCo.

In the Beginning Was Machine Language

By now, you all know about the 6809 microprocessor in the CoCo. In the CoCo 3, it's the 6809E, which is simply a faster version of the 6809. Both microprocessors use the same instruction set. The instruction set of the 6809 is thought by many programmers to be better than the instruction set of the 8088/8086/80286/80386 microprocessors used in MS-DOS systems (like the Tandy 1000 or 3000) because it's more of a "classical" set of instructions — more general purpose instructions that can use a variety of addressing modes.

Machine language instructions perform very primitive operations when compared to high-level languages. A typical instruction sequence is shown below, which adds the numbers from 1 to 10 with the result in the A register.

```
01001111                                  A <-- 0
1100011000001010                          B <-- 10
111101110011000000000000                  Store (B) in $3000
101110110011000000000000                  Add (A) and ($3000)
1100000000000001                          B <-- B - 1
111101110011000000000000                  Store B in $3000
0010011011110110                          Back 3 instructions if <> 0
```

Instructions operate at a byte or word level — eight or 16 bits of data — rather than in the floating-point format of BASIC. Consequently, you've got to implement your own floating-point subroutines and even design your own printer or I/O drivers in many cases.

Machine language refers to writing sets of instruction sequences in binary ones and zeroes, the only language that a microprocessor really recognizes. Although it's certainly possible to write code that way, it's very tedious. Chances are that, in a string of ones and zeroes that represent the "add the numbers from 1 to 10" code, you've made one or two data entry or logical errors. Deleting, modifying or inserting instructions means a tedious rehash of the ones and zeroes.

Assembly language is a way to make that coding less tedious. Instead of just ones and zeroes (or the hexadecimal equivalent), programmers write down instruction mnemonics. These are abbreviations for what the machine language instructions really do, such as `ADDA $3E04` for, "Add two one-byte operands, one from the `A` register and the other from memory location $3E04, and put the results in the `A` register." An assembler program takes the assembly source code and translates it into those ones and zeroes in "object code." The object code is what is loaded and executed in the microprocessor. The assembly language version of the "add the numbers" code is shown in the listing. Everything to the right of the `00`*xxx* line numbers is written and edited by the programmer. The line numbers, and everything to their left, are spewed out by the assembler program.

```
                     00100 *ADD THE NUMBERS FROM 1 TO 10
091F 4F              00110 ADDNUM  CLRA              ZERO TOTAL
0920 C6   0A         00120 LDB     #10               COUNTER
0922 F7   3000       00130         STB    $3000      STORE
0925 BB   3000       00140 ADD010  ADDA   $3000        ADD 10+9+
0928 C0   01         00150         SUBB   #1           COUNT - 1
092A F7   3000       00160         STB    $3000        SAVE CNT
092D 26   F6         00170 LOPEND  BNE    ADD010       IF <> 0
```

The CoCo has several assemblers available. Some are "foreign assemblers," including the excellent Micro Works assembler, but the most popular assembler is Radio Shack's *EDTASM+* on cassette or disk. This is a highly interactive assembler written by Microsoft. It combines the assembler proper, an editor similar to the BASIC editor and a debug package called ZBUG, which allows you to execute and find errors in the assembled program under programmer control.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects or computers ranging from mainframes to micros.

The whole package allows in-memory assembly, editing and debugging in a nice, interactive environment.

Radio Shack no longer markets the *EDTASM+* disk assembler, even though it is indispensable for CoCo assembly language. (The cassette version is still around, at $39.95.) Why no *EDTASM+* disk assembler? Radio Shack is driven by what sells. If a product falls below a certain sales level, they pull it from the catalog. There are many copies of disk *EDTASM+* floating around, however.

One reason for *EDTASM+*'s demise is the availability of the OS-9 assembler. The OS-9 assembler has many of the features of *EDTASM+*, especially in the editing and assembling area. However, it does lack the interactiveness of *EDTASM+* — it's much harder to edit, assemble and debug an OS-9 assembly language program.

The philosophy of OS-9 assembly language is different, as well. *EDTASM+* assembly language programs run "stand-alone" without any operating system. OS-9 assembly language programs, or modules as they are called, run under the watchful eye of OS-9. This is a mixed blessing. Under OS-9 you can use many of OS-9's operating system calls to perform tasks such as reading a character or writing to the screen. On the other hand, all assembly language code under OS-9 must be position-independent.

Position-independent code means that references to absolute addresses in memory, such as the `$3E04` reference above, are verboten. Instead, an instruction-addressing type called program counter relative (PCR) must be used. Instructions are referenced to the current program location rather than fixed locations. The reasons for this are well-founded. OS-9 loads all types of program modules into memory at one time and keeps track of where they are. Modules must be able to operate anywhere in memory because there are no fixed locations.

Writing code in PCR addressing format is not that difficult (compared to normal assembly language code), but is rather limiting and just another complexity for a beginner to contend with. Coupled with the fact that you must know how to use OS-9 to run the assembler, using the OS-9 assembler is is no easy chore.

Assembly language, although difficult to learn and a tedious language in which to program, has one great virtue. It's extremely fast — up to hundreds of times faster than interpretive BASIC. It will always be the language of choice for powerful commercial applications that are meant to sell in large volumes.

CoCo 3 BASIC

CoCo 3 BASIC is mostly interpretive BASIC with a few Microware add-ons for the high resolution modes of the CoCo 3. `HCIRCLE`, `HCLS`, `HCOLOR`, `HDRAW`, `HGET`, `HLINE`, `HPAINT`, `HPOINT`, `HRESET` and `HSET` are like the counterpart commands for the CoCo 2, as are `LPEEK` and `LPOKE` (the latter are for extended memory). Other goodies allow error-trapping (`ERLIN`, `ERNO`, `ON ERR GOTO`, `ON BRK GOTO`) and additional screen control (`WIDTH`, `LOCATE`).

Interpretive BASIC for the CoCo 3 is every bit as powerful as Microsoft GW-BASIC for the IBM PC Compatible (MS-DOS) crowd.

Structured Languages

What is OS-9 BASIC (BASIC09) like? Before answering that, let me tell you about a controversy that's raging. There are computer science professors who literally *hate* BASIC. One of the chief reasons for this is its lack of structure. Industry and academia realized that something had to be done about all that "spaghetti code." One proposed answer was structured programming.

In structured programming, code is broken up into nice, neat modules. Each module performs a well-defined function, say, calculating a monthly payment given a principle amount, an interest rate and a time period. There is one entry point for each module and one exit point. Loops are indicated by indentations of code, and there are generally no `GOTO`s or their equivalents.

How is it possible to write a program without `GOTO`s? One way is by providing enough commands for loops. After all, most programs are one big loop with smaller loops inside and nested loops within loops. Another feature is the use of procedures. Procedures are simply the modules we've been discussing and are very similar to subroutines. However, procedures use parameters that are passed from a main program or another procedure. Variables are used in the procedure locally and may not be available outside the procedure.

Loops

Here's an example of a loop in BASIC09:

```
SUM = 0
I = 1
WHILE I <> 1001
   SUM = SUM + I
   I = I + 1
ENDWHILE
```

Here's another:

```
SUM = 0
FOR COUNTER = 1 TO 1000
   SUM = SUM + COUNTER
NEXT COUNTER
```

Both loops do the same thing: compute the sum of the numbers from 1 through 1000. Notice one thing about this code — it doesn't have line numbers! None of the structured languages, including BASIC09, require line numbers, although some, including BASIC09, may allow optional line numbers.

Procedures

Structured languages get around the lack of line numbers and subsequent lack of `GOTO`s not only with loops, but with procedures. There is usually one main procedure that calls many other procedures in a program. Sub-procedures may call other procedures and so forth. Here's a typical sequence in BASIC09:

```
PROCEDURE COMPUTEA
   PARAM B,H
   TEMP = .5 * B * H
   PRINT "Area="; TEMP
END

PROCEDURE COMPUTET
   PARAM B,S
   TEMP = B + 2, S
   PRINT "Perimeter="; TEMP
END

REM MAIN
   INPUT SIDE, BASET, HEIGHT
   RUN COMPUTEA ( BASET, HEIGHT )
   RUN COMPUTET( BASET, SIDE )
```

The first two modules are procedures, called by the two `RUN` statements in the main body of code. Each procedure has variables that are used within the procedure — `B,H` in the first procedure and `B,S` in the second procedure. These parameters (`PARAM`s) are used within the procedure *and are* not recognized within the `MAIN` program. The 'B' in the first procedure is a different, local 'B' from the one used in the second procedure. Parameters are passed between procedures by the `CALL` statements. In this example, the values of `BASET` and `HEIGHT` are passed to the `COMPUTEA` procedure and become `B` and `H`. The values of `BASET` and `SIDE` are passed to the `COMPUTET` procedure and become `B` and `S`. Because each procedure uses local variables, there is no confusion about using variable names more than once in different parts of the program. However, global variables are still possible and can be used in any procedures if necessary.

The Controversy

One of the first structured languages to be widely used was PASCAL, which was designed by a Swiss computer scientist, Niklas Wirth. It was developed for computer science use and, presumably, was easy for students to use. An example of PASCAL code to do the "add numbers" problem is:

```
var
   sum, I : integer;
begin
   I := 1;
   while I <> 1001 do
     begin
        sum := sum + I;
        I := I + 1;
     end;
   writeln ( 'The sum of 1 to 1000 is ", sum );
 end.
```

You can see that PASCAL is somewhat "BASIC-like" but uses many of the elements of a structured language — indented code, `WHILE` loops, etc.

Another characteristic of structured languages, whether BASIC09 or others, is that the variables are strongly typed. In interpretive BASIC, you can use any name for a variable and really don't have to be concerned about whether the values held in that variable are integer (-32768 to 32767) or floating-point (values such as -87.88 or 564.002). In most structured languages, however, variables must be declared according to type, i.e., whether they are integer variables, single-precision, character or string variables, and so forth.

BASIC09

All of this sets the background for a description of BASIC09, the BASIC language used with OS-9. BASIC09 is definitely a structured language; it has optional line numbers, `WHILE` loops, procedures and data types, and it supports indentations. In addition, it has its own built-in editor, which is both line- and string-oriented.

BASIC09 is a compiler rather than an interpreter. The Extended BASIC interpreter used in the CoCo 3 processes BASIC programs a statement at a time. Each time through a statement, the interpreter asks, "What is this statement?" and "What are the variables?" Then it goes through methodically to search for the variables, compute expressions, and implement the BASIC statement before moving on to the next statement. If two more statements are processed and a return is made back to the original statement (as in a loop), the processing starts over from the beginning as if the interpreter had never seen the statement before. All of this processing of the BASIC text takes a great deal of time, so interpretive BASIC is fairly slow.

Compiled BASIC, however, operates differently. Rather than processing each statement every time it is encountered, the BASIC compiler makes one pass through all the statements from beginning to end (not as the program flows). At the end of this pass, the compiler has decoded much of the code into an assembly language or machine language form. This object code now executes much more rapidly than the interpretive version because much of the processing has already been done.

In general, compiled BASIC is much faster than interpretive BASIC. Under OS-9, though, BASIC09 is a lot slower than you would expect — only three or four times faster than interpretive BASIC in many cases. Why? The overhead of OS-9 has a lot to do with the speed — there's a lot going on in OS-9 and some of it is not done efficiently.

Running the BASIC09 compiler requires a different approach from CoCo Extended BASIC. Instead of being able to immediately edit and execute a line of BASIC code, a program under BASIC09 must first be recompiled. This makes debugging much more tedious — the quick interactiveness you find with Extended Color BASIC is not there, nor are the debugging tools, although BASIC09 has a trace mode and some interactive hooks.

On the other hand, because BASIC09 is a structured language, it offers certain advantages. It's easy to read and maintain code, has modules (procedures) that can become part of a library of modules to be used at will, and has some compatibility with other structured languages.

It's interesting to note recent developments of BASIC in the MS-DOS world that point to how structured languages are being received. Microsoft developed GW-BASIC, a version of interpretive BASIC that runs on MS-DOS systems and includes just about every convenient command that is possible to stick into a BASIC interpreter (including software interrupts for keys, communications data and error-trapping).

Microsoft also has a BASIC compiler that is compatible with the commands found on their BASIC interpreter. It allows you to write a program in interpretive BASIC, use the great interactiveness of the interpreter to debug the program, and then compile the program for high-speed operation.

Not too long ago, Microsoft also introduced a new compiler called *QuickBASIC* for MS-DOS machines, which not only recognizes GW-BASIC commands, but also provides structured programming commands, such as `WHILE/WEND` (looping, also in GW-BASIC), `IF/THEN/ELSEIF` (a type of `CASE` statement), and `DO UNTIL` (another type of loop). The result is a BASIC language very similar to BASIC09 in a highly interactive environment.

Just a few months ago, Borland International brought out its version of a structured BASIC called *Turbo BASIC*. This BASIC also recognizes the GW-BASIC commands, but provides a structured programming format and commands as well.

With premier developers like Microsoft and Borland making these efforts, it seems structured programming for BASIC is alive and well. BASIC is changing to be competitive with the current structured languages like PASCAL and C!

More on PASCAL

We've seen a brief example of PASCAL, but let's look a little further into it. PASCAL has achieved a great deal of interest as a language because of its use in computer science curricula, but it is not widely used in industry. Languages such as COBOL (Common Business Oriented Language) and FORTRAN (Formula Translator) both see a great deal more use than PASCAL. Interestingly enough, both are almost 30-year-old languages, which says something about being there first.

PASCAL is widely used on micros, though. One of the reasons for this is the huge success of Borland International's *Turbo PASCAL*. This is a PASCAL compiler for MS-DOS systems such as the Tandy 1000 or IBM series. Two reasons for *Turbo*'s success are the high degree of interactiveness in the compiler — it has a built-in editor — and the raw speed of compiled programs.

Unfortunately, there is no Borland equivalent for OS-9. The PASCAL compiler under OS-9 is certainly adequate, but not exciting. It's a compiler like many compilers: no built-in editor, no interactive debugging tools, and cryptic error messages. Also, there's a great deal of overhead to compile even short programs under OS-9. Whereas Borland's *Turbo* compiles in a few seconds, OS-9 PASCAL requires a few minutes. As I say, though, this is typical for most compilers.

Here's another sample of a PASCAL program. This one computes the area and perimeter of a triangle in similar code to the preceding BASIC09 example.

```
{ program to compute area and perimeter of a triangle}
Program Triangle
Var
    Side, Base, Height : real;

Procedure ComputeA;
var
    Temp : real;
begin
    Temp := 0.5 * Base * Height;
    writeln ('Area=', Temp);
end;

Procedure ComputeP;
var
    Temp : real;
begin
    Temp := Base + 2 * Side;
    writeln ('Parimeter=', Temp);
end;

{maan}
begin
    writeln ('Enter Side, Base, Height');
    readln (Side, Base, Height);
    ComputeA;
    ComputeP;
end.
```

The C Language

C is another language of the same ilk as BASIC09 and PASCAL. It's highly structured and has many of the same commands and capabilities as PASCAL. C has a reputation as a systems programmer's language because it gets down to the nitty-gritty, allowing programmers to perform bit operations. It has become very popular on micros, and many applications that would formerly have been done in assembly language are now being done in C.

Here's a sample program in C — the same application as previously illustrated:

```
/* Program to compute area and perimeter of triangle */
float Side;
float Base;
float Height;

compute_area ()
    {
        float Temp;
        Temp = 0.5 * Base * Height
        printf ("Area=%f\n", Temp);
    }

compute_perimeter ()
    {
        float Temp;
        Temp = Base + 2 * Side;
        printf ("Perimeter=%f\n", Temp);
    }

 main ()
    {
        printf ("Enter Side, Base, Height\n");
        scanf ("%f %f %f", &Side, &Base, &Height);
        compute_area ();
        compute_perimeter ();
    }
```

You can see from the example that C has the same general appearance as PASCAL. Also obvious is that C has "type

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Our Fourth Adventure Contest

Time passes quickly as you use your nimble fingers to escape the very passion that consumes you. Thoughts are fleeting at a time in which you need them most. The spidery web of mystery and intrigue you have spun is now entangling you. Every breath you take . . . Every move you make . . . Is it correct? Will it even accomplish the task at hand? Is there any time left?

No, we don't mean to imply time is nearly up for our Fourth Adventure Contest. Plenty of time remains. However, the final deadline for your entry in this contest is August 15, 1987 — a date that is rapidly approaching. So, you'd better get started soon, if you haven't already begun.

What? No ideas, you say? Just take a look around you! Your everyday life presents you with hundreds. Just sit down and start now! We await the very best you have to offer. If you want some pointers, check out "The Adventure Writer's Toolkit" (April 1985, Page 105) by Eric W. Tilenius. Or, for another helping hand, see "The Adventure Processor" (August 1986, Page 26) by Bill Cook. These articles, and many more, are just what you need to get started on the right track.

Your Adventure can be written for a 4K early model CoCo, or it can be written to take advantage of all the features in a 512K CoCo 3. It can be written under Disk BASIC, or it might be a creation in BASIC09.

Judging: The judges of the Fourth Rainbow Adventure Contest will be looking for several things in each entry. In addition to ensuring each submission is complete, they will consider the following:

- Originality
- Creativity
- Programming Efficiency
- Clarity of Instructions
- Ease of Use
- Vocabulary and Grammar
- Responsiveness
- Level of Challenge
- Enjoyment

The judges will also be concerned with the "publishability" of each Adventure. A shorter program is easier to fit into print (both in THE RAINBOW and any subsequent Adventure book) as well as being easier for the reader to type in. While the use of graphics tends to enhance any program, graphics are not necessary for an Adventure to win. The winning entry will be chosen for its unique appearance. Make your Adventure stand above the rest!

RULES: Your submission should include all programs and information needed to set up and run the Adventure. All programs must be sent on tape or disk with several saves of each program including at least one ASCII save. If an Adventure cannot be loaded, it cannot be judged. We will not type in even the shortest of programs! Hard copy of all program listings and instructions must also be included. If your Adventure uses machine language routines, *all source code*, as well as assembled object code, should be included on the tape or disk. Indicate the minimum CoCo system required to run your Adventure and include a complete solution!

Please, don't use packed lines that can't be LISTed or LLISTed for the benefit of our readers. Your program should run on standard Radio Shack equipment without requiring any special modifications and should not rely on commercial software for its execution. The only exception is the use of the OS-9 operating system (Level I and Level II) and BASIC09. If your Adventure uses graphics, make sure the graphics are self-contained. In other words, don't submit a program that loads several different graphics screens unless those graphics are created by a publishable program included in the submission.

In summary, send a complete package. Put the accompanying article, documentation, listings, complete instructions and solution, and cover letter on paper. Include your name, address and telephone number on each page of all materials. Be sure to write-protect your disk or punch out the tabs on your cassette to avoid accidental erasure, and label each with the name of the program(s) and your name and address. As in any contest, packaging does make a difference.

Your entry must be postmarked no later than August 15, 1987, in error-free condition. Each entrant will receive a free pass to the RAINBOWfest of his or her choice. You may also win one of the many prizes donated by our generous advertisers as well as have your program published in THE RAINBOW. So, get a move on! Write it up, put it together and send it to:

Adventure Contest Editor, Rainbow Magazine, 9509 U.S. Highway 42,
P.O. Box 385, Prospect, KY 40059.

Additional Rules: All entries must be original, unpublished and unmarketed works (no "conversions"). No programs that have been placed in the public domain are eligible. All entries become the property of Falsoft, Inc., publisher of the THE RAINBOW. The decisions of the judges will be final. Duplicate prizes will be awarded in the event of a tie. Winning entries will be featured in a future issue of THE RAINBOW.

Prizes: Following is partial list of the prizes the winners of our Fourth Rainbow Adventure Contest will be receiving. And, many more prizes are being donated each day!

Tandy/Radio Shack	DMP-106 Printer	$200
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	The CoCo Wheel of Fortune	$20
Frank Hogg Laboratory, Inc.	Inside OS-9 Level II (5 books)	$40 ea.
Howard Medical	Zenith 12" Amber Video Monitor	$150
HJL Products	Softswitch Auto/Manual Printer Switch with cables	$140
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RAINBOW's Delphi SIGs	Three five-hour free evenings in your choice of the CoCo or OS-9 Online SIGs.	$36 ea.
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Derringer Software	Pro-Color-Series Enhanced Version 2.1	$80
Speech Systems	Super Voice Speech Synthesizer includes Text-to-Speech Translator Program	$80
Tom Mix Software	Worlds of Flight (2 programs)	$35 ea.
Spectrum Projects	Three Book Set: CoCo III Secrets Revealed The History of the CoCo BASIC Programming Tricks	$50
CompuServe	IntroPak — An Introductory Subscription (3 IntroPaks) includes $15 usage credit	$15 ea.
Microcom Software	Utility Routines Volume II	$30
Sugar Software	Trig Attack	$20

variables" — variables must be explicitly declared as `int` (integer), `float` (floating-point), `char` (character), and others. In C, a program is subdivided into procedures that are called from the main program or from other procedures. No line numbers are used, and there is no `GOTO` command in the language. Although not obvious from this example, C has the same type of loop control as in other structured languages — `WHILE` loops, `FOR` loops, and `DO/WHILE` loops. The `scanf` and `printf` commands take the place of PASCAL `READ` and `WRITE` commands and use special characters for formatting action, reminiscent of some of the formatting in FORTRAN programs.

C is so popular that both Borland and Microsoft are rushing to put out high-speed C compilers for MS-DOS systems. The only version of C we have available for the CoCo is the Microware C compiler. Like the PASCAL compiler, this is a typical C compiler — it operates from a previously edited source file, contains most of the standard features found in C, and is somewhat slow in compilation. Still, it works well in the OS-9 environment, and we can thank Radio Shack that it is available.

Other Features of BASIC09, PASCAL, and C

All three languages allow numeric, string and multi-dimensional arrays. Arrays in BASIC09 and PASCAL must be fixed in size. In C, the arrays may be dynamic. The size of the arrays may change as the program requires it.

User-defined (enumerated) variables can be used in PASCAL and C. Suppose you wanted to define computers of a certain type. You could define a set of variables called `COMPUTER` that included the items `Tandy_1000`, `IBM_PC`, `Apple_IIGS` and `Cray_XMP`.

Linked lists and trees may be processed in PASCAL and C by the use of a special data format called pointers. Linked lists are advanced data structures that build a list of data elements, each element having data and a pointer to the next data element in the list. The pointers may be easily changed to insert, delete or modify items in the list.

Functions or procedures can have local variables, as mentioned before. This makes each procedure in the three languages a stand-alone module that does not have to be rewritten with new variable names for a new program. Another related feature found in all three languages is recursion, the ability of a procedure or function to call itself. Recursion can produce elegant code, as in this C example to find factorials:

```
long int factorial (x)
    int n
    {
       long int answer;
       if ( x == 0 )
          result = 1;
       else
          result = x * factorial (x-1);
       return (answer);
    }
```

Here, the function `factorial` calls itself from within the function. (You might look upon this as a picture of a man reading a newspaper, which contains a picture of a man reading a newspaper, etc.) Is recursion useful? Not nearly as useful as you might think, because it consumes huge quantities of memory in building a stack of return addresses and data. On top of that, it has a great deal of overhead. However, the code *is* elegant.

OS-9 Language Documentation

Microware documentation on PASCAL and C is terrible. It's summed up in these words from the OS-9 PASCAL reference manual: "Either you know PASCAL, or you don't." The reference manuals don't claim to be courses in PASCAL or C programming, and I can understand why tutorial information isn't included. However, operating information is of a more generic nature and does not address the problem of using the compilers on the CoCo. Useful information is hard to find or nonexistent.

"Should you use a structured programming language or interpretive Microsoft/ Microware BASIC?"

The BASIC09 portion of the Color Computer 3 operating system reference manual, however, is another story. Written by Radio Shack's R. Bartly Betts, formerly a RAINBOW contributing editor, it does an excellent job covering BASIC09. You should have a much easier time learning this language than stumbling through the forests of PASCAL or C.

Conclusions

If I sound a little tough on the compilers for the CoCo, I really don't mean to be. Here's a truly inexpensive machine capable of multitasking with relatively high resolution graphics and with three of the most popular higher-level languages available for it at rock-bottom prices. Since I love the CoCo, I only wish we had the equivalent to *Turbo PASCAL*, *QuickBASIC* and *Turbo C* to run on the system. An easy-to-use compiler would make the task of coping with OS-9 a great deal less frustrating.

However, we *don't* have these products and must use the existing BASIC09, PASCAL or C compilers. The fact is, once you've cut through all of the preliminary procedures to assemble a working disk for compilations, learned the quirks of the system, and put in some time studying the language, you have the ability to compile some pretty neat programs in the language of your choice.

I think the crux of the problem here is this: Should you use a structured programming language or interpretive Microsoft/Microware BASIC? Certainly, if you're going into computer science or business applications programming, you'll have to know a structured language like PASCAL or C. On the other hand, it's possible to use "street BASIC" with line numbers and still crank out some pretty good, efficient programs. Anyone capable of writing large programs in non-structured BASIC should be capable of using the structured languages, as well. Writing programs in structured languages seems to produce very "wordy" programs that often are slower than they should be. BASIC09 may be a good compromise between the ease of use of some of BASIC commands and functions, and a well-structured language.

In any event, BASIC09, PASCAL and C are inexpensive and available on the CoCo under OS-9. Try your hand at these languages and find the one that appeals to you. Don't forget assembly language, either — it's worth the grief and agony to get the high speed. In future columns, we'll try to provide coverage of not only PASCAL, C and BASIC09, but assembly language on the CoCo as well. Believe it or not, there's a lot of common ground among all these languages.

Where to Find Rainbow

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

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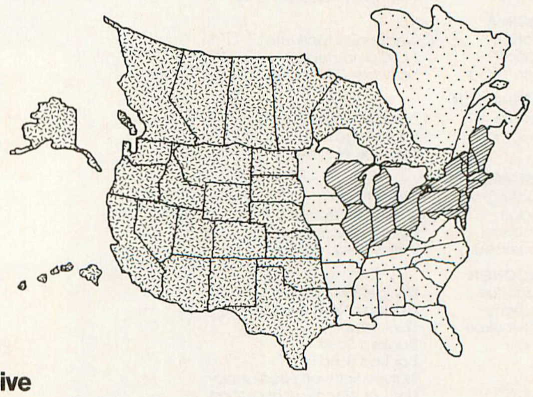


RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service. An order form for these services is on the insert card bound in the magazine.

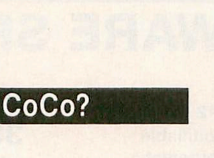
What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. (While many TDP-100s are still in service, the TDP Electronics division of Tandy no longer markets the CoCo look-alike.) It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: CMDS and SOURCE. It also contains a file, `read.me.first`, which explains the division of the two directories. The CMDS directory contains executable programs and the SOURCE directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the SOURCE directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the CMDS directory, enter `dir cmds`. Follow a similar method to see what source files are in the SOURCE directory.
5) When you find a program you want to use, copy it to the CMDS directory on your system disk with one of the following commands:

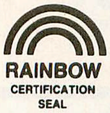
One-drive system: `copy /d0/cmds/` *filename* `/d0/cmds/` *filename* `-s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/` *filename* `/d0/cmds/` *filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal



The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

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8 CM 515 has analog RGB for CoCo 3, TTL RGB for Tandy 1000 or IBM PC's, and composite color for CoCo 2 and 3. Built-in speaker. 14" screen with 640 dot × 240 line resolution. Plus 2 years parts and labor warranty.

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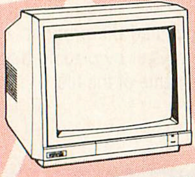

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CC-3 Magnavox RGB cable.
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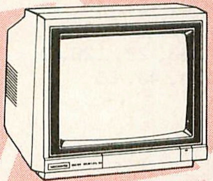

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APO, Canada and Puerto Rico orders slightly higher.

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DC-3P Mini Eprom programmer includes all software to program 2764 or 27128 chips **$55**

2764 8K Eprom 28 pin **$8.50 each**

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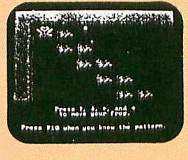
Press F10 when you know the pattern.

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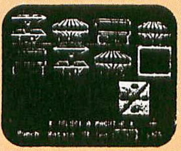

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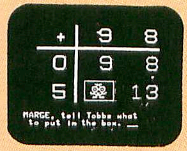

MARGE, tell Tobbs what to put in the box. _

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We call it The Preble Thoughtware.

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IMAGINE! Some day, a computer so advanced that it responds to your very thoughts and emotions. Imagine, some day, thought-controlled graphics: levitation and materialization!

PLUG IN YOUR MIND and UNHOOK YOUR JOYSTICKS — that day is now! The Radio Shack Color Computer has many advanced capabilities, just waiting to be tapped. Dr. Preble's Programs combines the advanced technology of the CoCo with the amazing Radio Shack BIOFEEDBACK MONITOR to bring you "Preble Thoughtware."

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*** Basic Freedom ***

for The Color Computer 3 (with versions for CoCo 1 & 2)

A Full Screen Editor for BASIC Programming

We call it EDITOR 3. Chris Babcock wrote a pure, efficient Machine Language program to open a new dimension of ease and power for anyone typing in a BASIC program.

Here are your BASIC Freedoms!

FULL CURSOR MOVEMENT — Use the arrow keys to move anywhere on a screen. If you are using a Color Computer 3, then even the 40 or 80 column screen is supported!

INSERT, CHANGE or DELETE CHARACTERS anywhere on the screen. Simply move to what you wish to change, change it and continue working!

LOWERCASE COMMANDS are OK! EDITOR 3 lets you type in lowercase any time or all the time. Lowercase command words are automatically translated to uppercase for BASIC. Of course, lowercase text within quotes stays lowercase. This is great when typing wiht the CoCo 3's 40 or 80 column mode with true lowercase!

MERGE LINES within a program with just a few keystrokes!

AUTO KEY REPEAT — Hold down any key and it will repeat.

INVISIBLE — Once EDITOR 3 has been loaded in, it is activated with a single keystroke! It hides itself out of the way of other programs and can be turned off any any time. Pressing RESET will not hurt EDITOR 3!

EASY TO USE — Installation takes seconds! Well-written goof-proof manual included.

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